QUEENSLAND AGRICULTURAL JOURNAL

VOL. V. JUNE, 1916. PART 6.

Agriculture.

RECRUITING IN GREAT BRITAIN.

(From the "Live Stock Journal," London.)

LABOUR ON THE STATE FARM.

Whatever may be the ultimate conclusion Parliament arrives at as to the future means of raising recruits for the Army, farmers and live stock breeders will find that a remarkably clear note has been struck upon the subject of their duty, and also that of their assistants, to the country by Lord Selborne in a statement he issued from the Board of Agriculture offices. The President of the Board has been so inundated with inquiries from agriculturists of all kinds as to the effect of Lord Derby's recruiting scheme that the statement he has prepared seeks to solve some of the problems that have arisen and are still likely to arise after the unsatisfactory debate in the Commons.

Certain classes of skilled agricultural workers have been starred in connection with the National Register. These will in no case be enlisted for immediate service with the colours, even if they offer themselves for that purpose; but they can, if they wish, be attested, passed

THE UNITED INSURANCE COMPANY, LTD.

PURELY AUSTRALIAN.

Give this Company your FIRE, MARINE, and ACCIDENT Insurance Business.

AGENTS EVERYWHERE. Offices at Brisbane, Rockhampton, and Townsville.

ERNEST WICKHAM,
Manager for Queensland.

at once into Section B, Army Reserve, grouped, and returned to their civil occupations. A man accepted on these conditions will be entitled, as a soldier in the Reserve, to wear a khaki armlet, which will be given to him by the military authorities. Men will be grouped in the reserve in forty-six classes according to their age and condition, *i.e.*, married or single, and the groups will be called up for service in order. Starred men will not be called up for service unless the recruiting officer appeals to the local tribunal appointed by the District Council, on the ground that a particular man is improperly or unnecessarily starred. In such a case the local tribunal will investigate the case and report to the Central Appeal Committee, who will decide whether the man should be called up for service or not.

If any starred man has inadvertently been enlisted for immediate service with the colours, the employer at once should notify the Secretary of the County War Agricultural Committee and write to the War Office, who have undertaken to make every effort to return him to civil occupation.

In addition to the starred men, there are the cases of certain men who have not been starred owing to misdescription or other causes. If such a man offers himself for enlistment, the employer will have the right of appeal to the local tribunal, and, if it is decided that the man ought to have been starred, he will be placed in the same position as a starred man.

There are also certain men who, though they do not belong to the starred classes, are really indispensable on the farms or in the trades allied to agriculture. The man who manages a farm heads this list. If men who are really indispensable from the national point of view for the cultivation of the land feel impelled to offer themselves for military service, Lord Selborne strongly advises them not to enlist for immediate service, but to exercise their option of being attested and passed into the Reserve. This will ensure their present continuance in their civil occupation, and on each occasion that their group is called up an opportunity will be given through the local tribunals for consideration whether, on national grounds, their service should not be postponed to a later date.

We therefore feel certain that such an arrangement as the above should ensure that farmers, live stock breeders, and other agricultural employers shall keep their properly-starred men, and that in the doubtful cases they shall not be denuded of labour without being afforded an opportunity of having those cases considered; and, further, it will give them some necessary time to engage and train women or other substitutes.

Farmers themselves, in common with other employers, have not been starred, but it is essential that at least one member of the farmer's family should remain to direct the business. Lord Selborne considers that farmers of military age who desire to join the Army should not enlist for immediate service, but be attested and passed into the Reserve. He also feels sure, in view of the arrangements made for the retention of the skilled and indispensable men, that farmers and other agricultural employers will encourage the immediate enlistment of men who are not really indispensable.

With regard to the recruiting scheme of skilled farm workers, Lord Selborne desires it to be clearly understood that if a skilled agricultural

labourer, who has been "starred" as such, leaves his employment on the farm in order to take up other work not connected with agriculture, the "starring" of that man will cease to be operative, and he will be liable to be canvassed and enlisted for immediate service with the colours.

Lord Selborne's lucid statement should be kept well before farmers and live stock breeders. While city men and townspeople may, for the nonce, feel a legitimate indecision as to what the Government really does want, the countryman has had his position clearly defined for him. We can still hear these words which Lord Selborne rapped out into the ears of 200 leading agriculturists in that small committee-room of the House of Lords late in August last, when delegates from all the leading associations and unions met to hear his appeal. Said he on that occasion:—

"I hope those farms which have been nearly denuded will not be thoroughly denuded; at any rate, I have done, and I shall do, my best to take care that nowhere are what I call the most skilled class of agricultural labourers taken. What I shall aim at—and Lord Kitchener has been very sympathetic whenever I have conversed with him on the subject—is to leave you your foremen, your stockmen, carters, and shepherds. But if these are left you, in many cases the rest of the work, if done at all, will have to be done by women or by men who have not hitherto been engaged in agriculture."

And, again, he reiterated, when responding to a vote of thanks:—

"I say to the highest skilled men in agriculture—the foremen, stockmen, carters, shepherds, engine-drivers, thatchers, and blacksmiths —I say to them—if you leave your present post and go into the Army or Navy or into a munition factory, your motives may be good, but your judgment is wholly bad, and you can perform a greater service to England to-day by staying where you are than by going anywhere else."

Yet, in spite of these words, many farm hands have enthusiastically joined the colours. Fighting blood and the fighting spirit will out, whatever the walk of life. At the moment farm labour of any kind is difficult to secure, and skilled ploughmen—indispensable to the successful conduct of farming operations—are so scarce that farmers are asking that they should be starred, or, at least, put into a later division, so that their help will be available to the very last moment. The advice to plough up grass land, to grow a greater breadth of wheat, and to produce more food cannot be acted upon unless a sufficient number of helpers are left to accomplish the necessary work. So far, there has been no uniformity in recruiting. Some farmers have lost no responsible man, while others have given up their most valuable helpers. In many villages the young men have voluntarily enlisted *en masse*, but in others they are still waiting to be fetched. An even distribution of men skilled particularly in horse management is desirable, but the call of the Army is luring into its ranks all those high-spirited country boys who love the horse and the honest smell of stable hartshorn, and feel the stir of their blood in the work and evolutions of that branch of the Army which is, at the moment, appealing most mightily to the country-born boy—the Artillery.

A Scottish correspondent is prone to be dismal on the subject. He tells us that, with fewer men at a farm, it follows that a less number of

live stock will be kept. Already there are indications that many will leave fields of lea unploughed, he adds. Such steps might lead to serious results, apart from upsetting the rotations. Farmers are very willing to increase food production as far as possible, but the instrument for doing that—skilled labour—is being speedily thrust from them. Such views as these may not quite be merited, judged in the light of Lord Selborne's statement mentioned in our opening remarks. Yet the effect of recruiting on the agricultural labour market was brought sharply into view at the Martinmas hirings held during the week. Wages were higher all round. At Appleby there was a good supply of labour, considering the circumstances. At Carlisle "best men" received £25 to £30; men who can plough, £20 to £25; younger men, £17 to £20; lads, £12 to £15; dairy women, £14 to £16; young women, £9 to £11; and girls, £7 to £8. At Lancaster the situation was aggravated by the hesitation of farmers to engage men who may be requisitioned for military service. Men stood out for higher wages, and in order to get labour of any kind farmers were obliged to yield. Lads of seventeen years of age got as much as £20, and lads out for the first time from £8. There was also a great scarcity of women, especially good milkers. Experienced women received £14 10s. At Malton the effect was marked. Those present consisted mainly of young lads, and foremen, shepherds, and wagoners were hard to secure. Good foremen received £35 to £40 per year; hinds, 20s. to 22s. per week; beastmen, £24 to £28; shepherds, to £30; wagoners, to £27; and ploughmen, to £22.

All this, like everything else, hangs, of course, upon the future decisions of Parliament. As yet we have no clear course mapped out for us. Mr. Asquith, answering questions in the House of Commons, on Tuesday, as to recruiting and compulsion, expressed a confident belief that it would not be necessary to resort to coercive methods. Yet he did not know why married men were enlisting in the belief that they would not be called upon until all the young unmarried men had been called up. It was quite clear, he remarked, that there must be cases where it must be left to the discretion of the local tribunal, and with regard to which it might well be proved that unmarried men should not go. Compulsion could not be decided upon without the consent of Parliament. Out of all the maze of debate, charge and counter-charge of alleged conspiracy, as mentioned by Mr. Bonar Law the same night, the one outcome stands clear—that the country will do whatever is asked of it, and that no more loyal supporters to the Crown and to the Army exist than the farmers of Britain, their sons, and their hired hands.

DESTRUCTION OF TREES BY POISON.

Notwithstanding the numerous articles which have appeared in this Journal and the numerous letters we have written in reply to inquiries, giving clear instructions as to the method of killing trees and preventing the growth of suckers, by treatment with a solution of arsenic and soda, we yet receive many letters asking for information on the subject. "Garden and Field," Adelaide, has the same experience, and writes as follows in its issue of April, 1916:—

ARSENIC AND SODA METHOD.

Why Treatment Sometimes Fails.

A subscriber wrote to "The Farmer and Settler" averring that arsenic was no good for tree-killing, as the trees suckered and the work had to be done all over again. The reply he received was that he had probably gone about the work in exactly the right way, but at altogether the wrong time. This paper has written literally hundreds of letters to landholders covering instructions for tree-killing; but has never known one failure in which there was not a certainty or at least a strong presumption that the arsenic was used when the sap was active in the tree. There are other possible causes of failure, but farmers are too accustomed to following plain directions to be likely to err in any other particular than in the matter of season. And the reason they fail at this point is because it is not possible to indicate precisely when poisoning, to be successful, should be done.

The time for poisoning, as previously stated, is when the tree is dormant—that is, when the sap movement is at its minimum and the sap down in the roots and lower portions of the trunk. This occurs in the winter months from, say, March to July, according to the district. On parts of the North Coast, ringbarking has been carried out to the best advantage as late as June and early July in certain years, whereas in the more central parts of the State, late February and March have generally found the sap movement at its lowest.

The main object in catching the sap to season is to prevent suckering. Trees can be killed by poisoning or ringbarking at practically any time of the year, but to prevent suckering it is highly important to operate when the sap is down, or just completing its downward course.

An officer of the New South Wales Department of Agriculture has put into condensed form the experience of thousands of landholders, and he gives this advice as to how to set about poisoning timber as a quicker and cheaper method of destruction than ringbarking.

To Dissolve the Arsenic.

Ordinary arsenic is not very soluble in water, and soda—either in the form of washing soda or of caustic soda—has to be used to dissolve it. Ordinary washing soda requires to be used in the proportion of three of soda to one of arsenic, and boiling is necessary to bring about a complete solution. Caustic soda, which is much dearer, need only be used in the proportion of two of the soda to one of arsenic, and the heat generated, if a reasonable amount of water is added, is sufficient to obviate the necessity for boiling. For large quantities, washing soda is preferable, because the cheaper, but for small quantities caustic soda is perhaps better because it is handier.

The Mode of Operation.

In dissolving the arsenic, whether for washing or caustic soda solution, there is one point worth remembering: Do not tip the whole of the arsenic into the solution in a dry state, but mix it to a paste slowly and carefully, in the same way as the housewife treats her cornflour;

then pour it slowly into a solution of the soda, stirring it all the time, and being careful to stand away from the fumes, as they are poisonous. When once the soda and arsenic are dissolved and chemically combined, the balance of the water can be added to make up the required quantity.

A useful strength for quick and effective work in all kinds of timber is a solution prepared on this formula: Arsenic, 1 lb.; washing soda, 3 lb., or caustic soda, 2 lb.; water, 4 gallons; whiting, 1 lb. The whiting serves as an indicator on the trees treated, as it turns white on drying, making it quite certain what trees have been dealt with. An empty kerosene tin makes a useful measure for dissolving in, as it holds 4 gallons.

The tree that is to be operated upon is first rung with a "frill" ring. There is no doubt that "frilling" alone would kill timber if allowed time, but the poison does it in a fraction of the time—in fact, trees have been killed in a few days. The cuts must be through the bark and well into the wood proper, and they must be as close to the ground level as it is convenient to make them, consistent, of course, with the shape of tree; say, from 6 in. to 10 in. up.

For trees of 4 ft. diameter about a quart of solution is poured into this frilling, right around the tree, using an old teapot or kettle, as the spout makes pouring easy and less is wasted by spilling. Smaller trees, of course, need less solution.

Saplings may be cut off low down, and the solution may be dabbed on with a swab stick to kill and prevent suckering.

It is very important that this frilling and poisoning be consistently and thoroughly carried out, and not in any way scamped or slummed, if good results are to be looked for.

No fears need be entertained about stock being poisoned by eating the fallen or dead leaves from treated trees, and there is not much danger if they are even allowed to remain on the area; but to make sure it is desirable that all live stock should be excluded for three or four weeks.

The Question of Cost.

Estimates of cost are hardly likely to be of use, as there are several factors that vary with the district. A recent report of the manager of the new Condobolin Government demonstration farm records that poisoning was adopted there with success and economy. The work was done by day labour at a total cost of 1s. 5d. per acre. This must be considered very low, as the country was fairly heavily timbered, and the wages were from 1s. to 1s. 4½d. per hour. Said the manager: "The timber has all died, and mostly within forty-eight hours from the time of ringing."

The liquid was distributed by means of 1½-gal. watering cans with spouts made specially long, and having exit holes about the size of a No. 8 wire.

OIL SEEDS WHICH CAN BE PROFITABLY GROWN IN QUEENSLAND.

LINSEED.

Amongst the drying oils linseed stands pre-eminent, and except in one or two applications, no oil can be used in its place as a drying oil. Linseed is a product of the flax plant (*Linum usitatissimum*), and has a value over and above its oil content, as food for stock, &c. The largest

supplies of linseed come from Russia. In Europe the plant is grown chiefly for its fibre. In other countries, notably the United States of America, Argentine, Uruguay, and British India, which, with Russia, produce the bulk of the world's supply of linseed, the plant is grown almost exclusively for seed. In Argentine, the area under this crop in 1915-16 was 3,999,000 acres, producing 1,005,000 tons of seed; Canada, 803,000 acres, producing 265,000 tons; United States of America, 1,367,000 acres, which yielded 321,000 tons; India, 3,629,000 acres. Flax has been grown in Victoria for some years, and has proved a very payable crop. In Queensland the crop has only been tried experimentally, but from experiments made in 1910 at Biggenden State Farm by Mr. D. Macpherson, present manager of Kairi State Farm, it was proved that Queensland is eminently adapted to flax cultivation. Mr. Macpherson sowed a plot of three perches in April, and the crop was harvested in September. Owing to want of rain the seed did not germinate till the last week in May, so that the crop only took four months from germination to harvest. A portion was cut before the seed was ripe for fibre samples. From the remainder (exactly 64 square yards) 22 lb. of clean, plump seed and 47 lb. of threshed straw were obtained, or at the rate of 27 bushels (60 lb. per bushel) of seed, and 31 cwt. 3 qr. of straw to the acre.

The price of linseed is quoted in British trade journals at from 88s. to 93s. per 424 lb., or about 12s. 6d. to 13s. 3d. per bushel. Previous to the war the price was 8s. per bushel. The yield of flax seed in the United States of America varies from 8 to 15 bushels per acre; in other countries on an average 10 bushels. In the Biggenden experiment the yield of seed was 27 bushels of a present value of over £16. In addition, the fibre yield (from 6 to 8 cwt. per acre) has to be reckoned at, say, £2 per cwt., and 1 cwt. of tow at 10s. per cwt.

As an oil crop, linseed contains from 25 to 40 per cent. of oil, worth for raw oil 38s. 6d. per cwt., for refined 45s. per cwt. Finally, prime linseed oil cake, after the removal of the bulk of the oil, contains 10 per cent. Thus, out of 3 tons of whole linseed, 1 ton of oil is removed, and 2 tons of cake or meal are left for cattle food. The oil is quoted at 38s. 6d. per cwt. for raw and 45s. per cwt. for refined.

The Board of Agriculture thinks there is no reason why farmers in this country should not grow linseed, and thus avoid buying supplies at the present excessive price. At any rate, it is worth a trial.

OLIVE OIL.

The olive tree thrives in many parts of Queensland, both on the coast and on the high lands, and there are many old and young trees bearing good crops annually. Excellent olive oil used formerly to be made at the Penal Establishment, on the island of St. Helena, in Moreton Bay. Unfortunately of late the fruit fly (olive fly?) so damaged the ripe fruit that oil-making was discontinued. This oil readily sold in Brisbane at 12s. per gallon. In olive-growing countries the average yield of oil per tree on plantation is about 2 gallons, but individual trees will yield as much as from 12 to 20 gallons, while one renowned tree is stated to have yielded 55 gallons, and another 3 cwt. of oil. Taking the average to be as low as 1 gallon per tree, and sixty-three trees per acre, the produce at 10s. per gallon would be £30 per acre in the earlier years of bearing, exclusive of the value of the oil cake.

To-day olive oil is quoted at 59s. per cwt.

In a future article we shall deal with other oil seeds, such as cotton seed, soja bean, coconut, castor, &c.

Pastoral.

IN-BREEDING.

The writer of Poultry Notes in the Rockhampton "Morning Bulletin" has opened up a theory on in-breeding in the case of poultry and other stock, which, however contrary to the opinion generally held by breeders—that in-breeding is a cause of the deterioration of farm stock—is yet a theory which has received practical proof in many countries. He deals mainly with poultry, but his deductions apply equally to other animals, wild and domesticated, as for instance the bison of North America, the Chillingham cattle in England, the buffalo of Northern Australia, the reindeer, polar bear, the Australian dingo, and a host of other animals in all parts of the world—all instances of in-breeding without deterioration. We submitted the article here reproduced to Mr. Cuthbert Potts, Principal of the Queensland Agricultural College, who replied that the principles set out in it are quite correct, and he agrees with the writer up to a certain point. All good strains of the various breeds, in fact, the various breeds themselves, have been developed by close in- or line-breeding. It is the only legitimate procedure to adopt.

In-breeding, however, he remarks, doubles up weak characters as even as strong. On this account it is a dangerous method to adopt unless the breeder is a very keen judge and has a good knowledge of his subject. He (Mr. Potts) thinks this largely accounts for the fact that in-breeding is looked on with disfavour. The subject is a very large one, and might form the basis of a series of articles in the "Q.A. Journal."

Our correspondent, who forwarded us the "Morning Bulletin" containing the article, says: "If that doctrine is true, then, it is a pity it is not known all over the world and would save a lot of money to breeders of all sorts of stock. If it is not true, then, it is a pity that any paper widely distributed among farmers advocates it."

Mr. W. G. Brown, Instructor in Sheep and Wool, Queensland, gives us the following note on in-breeding which corroborates the doctrine enunciated in the article in question. He says: "There is no sheep stud of any value in the Commonwealth which does not use the line system of in-breeding. It is very many years, for instance, possibly fifty years, since an out-cross has been used in the Wanganella (Riverina) Merinos. It is certain that no fixed type in stock can be made without intelligent 'line' or in-breeding."

Following is the article on which our remarks are based:—

"How many breeders are there in the 'fancy' to-day who have not at some stage of their experience received definite instructions from customers when forwarding fowls to exercise care in supplying male and

female unrelated? The majority of novices issue these instructions, not because from their experience they have proved close relationship in poultry-breeding unsatisfactory in practice, but because it appears to be an accepted fact that no beneficial results can accrue from such a policy. This idea is as widespread as it is erroneous, and will take many years to overcome any appreciable extent. It has risen in most instances through want of knowledge, and has been to some extent encouraged by many experienced breeders, who, aware of the increased opposition they would have to encounter in competition were in-breeding more generally resorted to, advise the novice in every instance to secure unrelated blood when purchasing a breeding-pen, well knowing that this is the best system whereby to deprive him of the opportunity of achieving satisfactory results.

"So far as can be ascertained, the chief objection raised against in-breeding is that it destroys the fertility and stamina of the stock and results in deformed specimens being produced. That these serious defects are apparent in many instances can readily be endorsed, but that they are due solely to in-breeding is a matter of very grave doubt. Weedy specimens occur in numerous instances in which relationship between the parents is as distinct as the poles, comparatively speaking, so it can safely be attributed to other causes. On the other hand, some of the best show birds that have even been penned—perfect giants of their race—have been the result of a union between brother and sister for the third successive generation.

"As illustrating the extent to which consanguineous matings can be carried without injurious effects resulting, the case of the ordinary blue pigeon may be cited. A pair of these birds will in a few years found a flock of several thousands, all bred from the closest possible union; each pair, when able to provide for themselves, taking up their share of the duty of increasing the flock and continuing it for several generations on precisely similar lines. It can be asserted without the slightest fear of contradiction that the keenest scrutiny would fail to detect the slightest difference in size, health, and stamina between one of the original stock and one of, say, the tenth generation. Further illustrations, such as the various native birds, dingoes, rats, and rabbits, can be referred to as proving that in-breeding does not affect the stamina of progeny of closely related parents. Incestuous breeding amongst all the abovementioned is notorious, yet it would require a bold opponent of in-breeding to say that either of the two latter, at any rate, have forfeited any of their vigour, or have decreased in size in comparison with their progenitors of recent decades.

"A solution of the problem appears to be in the fact that many breeders, through careless methods rarely keep their birds in sufficiently good health to ensure vigorous offspring, yet they attach the whole of the blame to the birds by inferring that their want of success was entirely due to the fact of the birds being in-bred. In quite 90 per cent. of the cases wherein the growing stock shows signs of inherited constitutional weakness, it can safely be attributed to neglect on the owner's part by breeding from immature stock, from birds inheriting some serious

disease, or from specimens so overburdened with internal fat that their system has become impaired to such an extent that expecting healthy progeny from them was the height of folly.

"All the above are factors operating against successful results being obtained, no matter whether in-breeding has been resorted to or not, but from birds of a suitable age, and kept in good, clean healthy condition, sound, vigorous stock can always be relied on, even though the closest relationship has existed for unlimited generations. Expert breeders, especially those who rely on poultry-breeding for the whole or greater portion of their income, are fully seized of the fact that in-breeding must be practised to a very pronounced extent if anything approaching permanent success be aimed at. They accordingly, when laying the foundation of their strain, take steps to secure their stud birds from a reliable breeder and insist on having them closely related. The resultant progeny from such show a uniformity of quality that is really surprising and, by the selection of the best specimens to make back to the parents—that is, the pullets to their sire and a cockerel to his mother—the ensuing result is highly satisfactory. In-breeding thus is only advocated, however, when some special quality is desired, and at least one of the birds bear evidence of possessing it. It would be obviously unwise to mate two birds that were closely related, each possessing a decided fault, and expect them to produce perfect stock. It follows, as a matter of course, that every point or feature is strongly impressed by each successive generation. Hence imperfections are intensified equally with desirable qualities where line breeding is adopted, provided the stock have a tendency in that direction. It is advisable, therefore, for the breeder at all times to make himself thoroughly acquainted with the standard requirements of the varieties he fancies, and, when such instruction is thoroughly mastered, its adoption should be aimed at by the most careful selection and making up of stock showing the nearest approach to perfection in the greatest average of points. If sound judgment be brought to bear upon the matter, it will prove a comparatively easy task, for, by judicious in-breeding many points can be fixed in a remarkably short space of time, and a strain can thus readily be brought to within measurable reach of perfection.

"Convincing proof of the advantages of in-breeding lies in the fact that many of the most successful fighting game breeders in England have bred and fought their strains of birds for over twenty years without the introduction of fresh blood into their flock. When this can be accomplished successfully with a breed requiring the strength and courage necessary for pit fighting, it will be readily conceded that nothing but beneficial effects would result from similar lines applied to utility stock.

"It will be unhesitatingly acknowledged by every experienced breeder that a variety of fowl possessing distinctive characteristics can be relied on when bred in line for several years to impress the same qualities on their progeny in a very decided manner. Therefore, it can be most emphatically asserted that in-breeding introduced for any definite object,

such as egg production, table properties, or special show points, can be depended upon to achieve most satisfactory results, for not only the energy of the parent stock, but also that of the grandparents and still more remote ancestors, is concentrated in one direction, and thus speedily achieves by prepotency a result that would take years to obtain where fresh blood is continually introduced.

"The majority of amateurs, when embarking in the venture of pure-bred poultry-keeping, generally secure a setting of eggs with which to make a beginning. Such is an excellent plan, and can be strongly recommended when a reliable breeder is selected from which to obtain same. When these chicks are hatched, being more prized than ordinary stock, they receive extra attention and more liberal feeding, generally on unsuitable and highly stimulating foods that play havoc with their digestive organs and render them wholly unfit to undertake the task of propagation of their species. It is the mating of such birds together with the consequent disastrous results obtained from them that has given rise to the cry that in-breeding is injurious; but surely any unbiassed individual must know that birds pampered to an unusual extent must always prove unsatisfactory, no matter whether bred from closely related stock or otherwise? As before stated, lack of vitality is the root of the failures extending over the breeding season.

In-breeding, therefore, cannot be carried too far, provided always that due attention be paid to the general health and vigour of the stud birds. It is on this point that nature teaches us a most valuable lesson, for, with in-breeding as with other details, she vigorously insists on that admirable law being strictly observed—namely, the survival of the fittest."

FARMERS' SHEEP IN THE BURNETT.

By "BRINY."

I have read with much interest the review by Mr. W. C. Brown of the article on the above subject appearing in the April number of your journal.

This review, coming from such a source, must be accepted as from an authority, but there is a matter in it on which Mr. Brown does not throw sufficient light, and on which the evidence appears to be so strong that I would like, as briefly as possibly, to carry my case a little further.

The whole foundation of my standing is, and it seems to me important that the point should be generally recognised, that robust conditioned sheep do not first become infested with worms, and then, with worms as a first cause, fall away in condition and die, but that they must first be reduced in condition, and their constitutions weakened by such causes as rank or unsuitable feed, when, other conditions being favourable to worms, they are then unable to naturally resist the ravages of the worms. I wrote, "for whom, we are told, it is natural in limited numbers, that they should be the hosts." I had for this last statement, which I quoted from memory, an authority whose name I am unable to

call to mind; but I find that Dodd says: "A few worms may probably be found in most sheep." It surely then follows that sheep are able to pick up a few worms on most pastures. Therefore, sheep, as Mr. Brown says, "carrying worms in limited numbers would soon, given moisture and warmth, be infested with unlimited numbers"; but this is not always the case, as in his example of six sheep per acre on Rhodes grass on the moist, warm coastal areas.

There is another example in the Dallarnil Scrub, where some sheep have been kept successfully for years on paspalum. They were bought on worm-infested country, and they were worm-infested when put on the paspalum (the writer sold them), yet they did very well, even when broken-mouthed; and I am told that, except during one wet summer, when the grass was rank and of a hothouse growth, they were not troubled with worms.

Mr. Brown writes: "As soon as the sheep can keep himself and the worms with which he is infested with a full supply of blood, he immediately begins to improve in condition. As he keeps on assimilating good fodder, he makes more and more blood, and reaches a good condition of health. He is keeping the worms in blood, and is also keeping himself in condition, because he is getting such good food that he has a surplus of blood for the use of his own economy." Now, if I may extend this statement to its natural limit, such a sheep, having reached a good condition of health, would acquire also a good condition of body and would also, at the same time, be highly infested with worms. Now, in actual fact, if a fat sheep or a fair conditioned sheep is killed from a worm-infested flock that has been some time on wormy country, it will not be found to be worm-infested to any material degree. A few worms may be found, but very few.

I have for several years in the past killed mutton from the best conditioned sheep of a worm-infested flock, and have always opened the stomach. Sometimes a few worms would be found, sometimes none, but never very many. Dry ewes have been killed, while at the same time the ewes of the same flock rearing lambs in the same paddock have been very highly worm-infested.

The condition of sheep among a worm-infested flock, feeding in the same paddock, varies according to the constitution of the individual sheep, not according to the quantity of worms picked up, for they are all subject to the same worm conditions, and the worm contents of the stomach will be found to vary in much the same proportion.

The bulk of the feed on such country is rank cattle feed, and unsuitable to sheep. Both classes of stock are subject to the same stomach worm, and surely the worm is picked up by both in the same proportion. But if the grass is eaten down by cattle they thrive and put on condition on such country. If sheep are compelled to eat it down they do not thrive, and the worms which they in common with the cattle pick up infest them.

If these grasses are first so fed down by cattle that only the sheep feed growing underneath is left, then if the country is lightly stocked with sheep they do thrive and resist the worms.

As was previously written, a well-nourished calf, reared on its mother, does not suffer with worms, yet how many poorly-nourished poddie calves die of worms yearly? The same remark applies to the fat lamb on its mother, while at the same time a weaner lamb in the same paddock may have its stomach as full of worms as a drain-pipe may be of roots.

In a somewhat similar way, a normal sheep will not carry cattle ticks, yet a poverty-stricken sheep will, on its bare parts, carry ticks to maturity.

And now, in conclusion, I may say that as to the mind of a person searching for the correct definition of a subject or a word there is more benefit to be derived from the reasoning and the searching than there is from the resulting definition. So also, if in my searching and reasoning I have expressed views resulting in variance with one who is able to express an expert opinion, I hope then that others, if they cannot agree with my results, may, at all events, with me obtain some benefit from the argument and reasoning preceding, and possibly be encouraged to try a few sheep on the forest farms of the Burnett. With this one object, after thanking Mr. Brown for his courteous criticism, I must leave the subject.

SHRINKAGE OF AUSTRALIAN WOOLS.

The U.S. Bureau of Standards have recently scoured several samples of Australian wool to determine the shrinkage.

Entire fleeces were not tested, but large handfuls of wool were selected from ten different parts of each fleece. The samples thus obtained were drawn from parts well distributed over the whole fleece (not including the skirts) and therefore gave the average. The one-half of each handful was placed together as one sample and is designated as "A" and the remaining portion of the sample marked "B."

The forty-nine fleeces herein described were carefully sampled and thoroughly cleansed of all grease and dirt, the results showing shrinkages from 19·5 to 54 per cent., according to the breed of sheep.

In the South Australian wools the greatest shrinkage difference between two determinations upon samples drawn in the same manner from the same fleece was 3 per cent., while for the New Zealand wools the largest difference was 6 per cent. These differences were calculated on the basis of raw-wool weight. This percentage variation within individual fleeces seems large, especially when the sampling was performed as described in the beginning of the article. If a sample had been drawn from one part of the fleeces and another had been drawn from an entirely different place, greater percentage variations would undoubtedly have occurred.

The difference in shrinkage between two fleeces of the same breed of sheep grown in the same location was found to be as great as 9·5 per cent. The results of such tests upon thirteen different breeds of sheep showed a mean variation of 4·5 per cent. in the shrinkage.—"National Wool Grower."

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR MONTH OF APRIL, 1916.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			Lb.	%	Lb.	
Lady Melba	Holstein	28 Oct., 1915	762	3·8	33·94	
Cocoatina ...	Jersey	17 Mar., 1916	563	4·7	31·19	
Lady Margaret	Ayrshire	14 Oct., 1915	523	4·7	29·49	
Madam Melba	Holstein	17 Dec. ,,	556	4·4	28·79	
Lady Loch II.	Ayrshire	17 Mar., 1916	601	4·0	28·22	
Gretchen ...	Holstein	16 Aug., 1915	475	5·0	28·02	
Belinda ...	Ayrshire	27 Feb., 1916	549	4·3	27·77	
Miss Bell ...	Jersey	2 July, 1915	434	5·4	27·70	
La Hurette Hope	,, ...	17 Nov., ,,	464	5·0	27·37	
Twylish's Maid	,, ...	22 Oct. ,,	384	5·8	26·36	
Auntie's Lass	Ayrshire	4 April, 1916	591	3·8	26·32	
Miss Jean ...	,, ...	5 Nov., 1915	587	3·8	26·08	
Lady Twylish	Jersey	5 June ,,	375	5·8	25·74	
Violette's Peer's Girl	,, ...	8 Dec. ,,	425	5·0	25·07	
Jeannie ...	Ayrshire	1 Nov, ,,	462	4·6	24·95	
Miss Melba	Holstein	30 Sept. ,,	581	3·7	24.18	
Bluebell ...	Jersey	20 June ,,	371	5·5	24·12	
Sweet Meadows	,, ...	28 Sept. ,,	317	6·3	23·66	
Miss Edition	,, ...	27 Sept. ,,	355	5·6	23·50	
Noble Dot ...	,, ...	2 May ,,	330	6·0	23·45	
Iron Plate ...	,, ...	20 Jan., 1916	382	5·1	22·94	
Rosebud II.	Ayrshire	11 Oct., 1915	339	5·7	22·86	
Bella ...	,, ...	25 Dec. ,,	450	4·2	22·20	
Miss Lark ...	,, ...	8 Sept. ,,	347	5·3	21·72	
Burton's Lily	Shorthorn... ...	13 Jan., 1916	472	3·8	21·01	
Silver Nell...	,, ...	16 Aug. 1915	369	4·8	20·89	
Rosine ...	Ayrshire	7 Aug. ,,	408	4·3	20·64	
Burton's Lady	Shorthorn... ...	13 Jan., 1916	518	3·4	20·58	
Special Edition	Jersey	1 Nov., 1915	368	5·4	20·49	
Lady Annette	Ayrshire	14 Nov. ,,	375	4·6	20·32	
Simple Interest	Jersey	22 Oct. ,,	362	4·7	20·05	

The above cows were fed on natural pasture only.

THE NUBIAN MILCH GOAT.

Since the publication of our articles on the milch goat and its management last year, we have received many letters asking for information on the subject.

Mr. W. C. Carmody, Inspector of Stock, Department of Agriculture and Stock, who has practical experience in the management of the goat as a domestic milk supplier, has on several occasions communicated with the Veterinary Department of the Ministry of Agriculture in

Egypt, and the Department of Agriculture and Forests of the Sudan Government, with a view to getting information on the treatment of goats in Africa, their value as domestic animals, the yield of milk, feeding, breeding, price of goats, export, &c. He has received very courteous replies from the heads of the above departments, which we summarise for the information of our correspondents.

It will be noted that the value of goats between 11th November, 1915, and 28th February, 1916, has been considerably enhanced, doubtless owing to causes arising out of the war.

On the first-mentioned date, Mr. W. A. Davie, of the Sub-department of Agriculture at Khartoum, Sudan, in reply to Mr. Carmody, courteously supplied the following information concerning the Nubian goat:—

The average yield of milk daily is from 3 to 4 rotls (1 lb. = 1·009 rotl) and the goat would give this quantity for 120 days, or 1½ to 2 rotls for 60 days. The average height of the animals is 80 cms. (32 inches about) and the average weight 90 rotls (nearly 90 lb.).

The price per head would be—for males, 45 pt. (9s.); females, 60 pt. (12s.). Port Sudan would be the nearest place for shipment. Landed there, the prices for males and females would be about 12s. and 15s. respectively.

The milk is rich in butter fat, the percentage on an average being 4·5. The males have no disagreeable odour at any time. They are of all colours, but generally black and tan. They have small curved horns and are very docile.

Mr. Davie said that goats from Upper Egypt are larger and better bred than those of the Nubian Sudan, and suggested communicating with the Ministry for Agriculture, Cairo. This Mr. Carmody did, and received a full reply, dated Cairo, 28th February, 1916, from the Director, Veterinary Service, to the following effect:—

Good goats give 2 litres (about 3⅔ pints) daily when in full milk, and from 200 to 300 litres (180 to 270 quarts) for a milking period of six to eight months. A selected goat might reach 3 litres per day when in full milk and give a total of 350 litres.

The average height of these goats is about 32-33 inches for males, and 28-29 inches for females.

Goats could be shipped at Suez, though probably Port Said would be more convenient.

Price for males, £3 to £5; females, £3 to £6.

It may be added that Mr. Davie says the chief characteristic of the Nubian goat is the ability to pick up a living in the most unpromising and most unlikely places.

The freight to the port of shipment would be only a few shillings.

Prohibition as to export from Egypt and import into Queensland: Provided that the permission of the Minister shall be obtained prior to the departure of any domesticated animal from the port of shipment to Australia, such animals may be imported into Australia, presumably if covered by a certificate by a member of the Royal College of Veterinary Surgeons.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1916.

The new competition commenced on 1st April with 73 pens, 20 of which are in single hen tests, making a total of 438 competing birds. These include 55 pens of White Leghorns, 10 of Black Orpingtons, 4 of Rhode Island Reds, and one each of Red Sussex, White Wyandottes, Silver Laced Wyandottes, and Sicilian Buttercups. Some of the birds were too old when sent, and had been laying for some time; in nearly every case these have gone into moult. The pens owned by the following are in moult:—Messrs. Manson (White Leghorns), Gill, West, Pettit, Purvis, Coates, Becker, Dennis (White Wyandottes), Moritz Brothers, Lindus, Hammill, Lency (Rhode Island Reds), Knowles, Richter, Pocock, and Smith. The pens of the following owners have had a slight attack of chicken pox:—Burns (Black Orpingtons), Cowan Brothers (2 pens), Mars, P. F. (White Leghorns), and Mrs. Bradburne. A few of the other pens are off their food and may go into moult at any time. Many of the birds that were laying on arrival here have completely stopped for the above reasons, so that the average for the month is very low. Mr. T. Fanning wins the monthly prize with 104 eggs. The following are the individual records:—

Competitors.	Breed.	April.
*T. Fanning, Ashgrove, Brisbane	White Leghorns ...	104
*J. Anderson, Mordialloc, Victoria ...	Red Sussex ...	86
T. B. Hawkins, Redbank	White Leghorns ...	77
Mrs. Bradburne, Kogarah, N.S.W. ...	Do ...	75
S. B. Tutin, Kalkie, Bundaberg	Do. ..	66
A. H. Padman, Adelaide, S.A.	Do.	65
A. Howe, Wickham, Newcastle, N.S.W. ..	Do.	64
*Mrs. J. Jobling, Plattsburg, N.S.W. . .	Blac Orpingtons	64
*A. T. Coomber, Brown's Estate, Bundaberg ..	White Leghorns	64
T. E. Jarman, Eastwood, N.S.W.	Do.	62
P. Brodie, Glengyle, Greenmount	Do.	62
*J. Zahl, Boonah	Do.	61
*A. E. Walters, Bank street, South Brisbane	Do.	56
*Dixie Egg Plant, Newmarket	Do.	55
T. Taylor, Thompson Estate, South Brisbane	Do.	55
H. Jobling, Cessnock, N.S.W.	Black Orpingtons	54
G. H. Turner, Aratula	White Leghorns	53
*Kelvin Poultry Farm, Kelvin Grove, Brisbane	Do.	51

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	April.
W. Lyell, Graceville	White Leghorns ...	49
*E. A. Smith, Paddington, Brisbane	Do.	48
C. W. Holland, Paddington, Brisbane	Do.	48
H. W. Broad, Corinda	Do.	45
*J. H. Gill, Cheltenham, Victoria	Do.	45
Mrs. Munro, Sunnyside, Warwick	Do.	44
*J. H. Madrers, Kogarah, N.S.W.	Rhode Island Reds ...	44
E. Pocock, Windsor	White Leghorns ...	42
C. P. Buchanan, Brisbane	Do.	42
*C. Knoblauch, South Brisbane	Do.	41
King and Watson, St. Mary's, N.S.W.	Do.	40
J. M. Manson, Milton	Black Orpingtons ..	39
*E. F. Dennis, Brisbane	White Leghorns ...	38
*W. L. Forrest, Marrickville, N.S.W.	Do.	38
Geo. Tomlinson, Boonah	Do.	36
J. Anderson, Mordialloc, Victoria	Do.	34
W. Lindus, Cessnock, N.S.W.	Do.	34
A. W. Bailey, Red Hill, Brisbane	Do.	33
F. Clayton, Blacktown, N.S.W.	Rhode Island Reds ...	30
Mrs. C. Davis, Engelsburg	White Leghorns ..	30
W. Meneely, Warwick	Do.	30
Kelvin Poultry Farm, Kelvin Grove, Brisbane ...	Do.	30
W. Hirst, Blacktown, N.S.W.	Do.	30
Dr. E C. Jennings, Ipswich	Do.	29
*J. M. Manson, Milton	Do.	28
W. H. Forsyth, Willoughby, N.S.W.	Black Orpingtons ...	28
F. Clayton, Blacktown, N.S.W.	White Leghorns ...	27
*W. H. Knowles, junr., Taringa	Do.	26
H. Hammill, Kogarah, N.S.W.	Do.	25
*E. West, Grove Estate, Brisbane	Do.	25
*Loloma Poultry Farm, Rockdale, N.S.W. ...	Rhode Island Reds ...	24
E. W. Leney, Warwick	White Leghorns ..	23
J. Gosley, Childers	Do.	22
W. Becker, Toowoomba	Do.	22
A. T. Coomber, Bundaberg	Sicilian Buttercups ...	20
Mars Poultry Farm, Sunnybank	White Leghorns ..	20
F. W. Leney, Warwick	Rhode Island Reds ...	19
Cowan Bros., Burwood, N.S.W.	Black Orpingtons ...	19
*Miss May Hinze, Milton	White Leghorns ...	19
Harveston Poultry Farm, Rockhampton ...	Do.	18
A. F. Camkin, Canley Vale, N.S.W.	Do.	16
Geo. Prince, Grove Estate, Brisbane	Do.	14
T. Fanning, Ashgrove, Brisbane	Black Orpingtons ..	13
L. K. Pettit, Eastwood, N.S.W.	White Leghorns ...	11
R. Burns, Sladevale, Warwick	Black Orpingtons ...	10
J. G. Richter, Aratula	White Leghorns ..	6
W. Purvis, Glanville Blocks, S.A.	Do.	6
Moritz Bros., Kalangadoo, S.A.	Do.	5
R. Burns, Sladevale, Warwick	S. L. Wyandottes ..	3
J. R. Wilson, Eudlo	White Leghorns ..	3
Mars Poultry Farm, Sunnybank	Black Orpingtons ..	3
E. F. Dennis, Brisbane	White Wyandottes ..	0
E. F. Dennis, Brisbane	Black Orpingtons .	0
Cowan Bros., Burwood, N.S.W.	White Leghorns ..	0
*J. W. Macrae, Mareeba	Black Orpingtons ..	0
Total	...	2,548

Pens marked * are engaged in single hen test.

RETURNS FROM SINGLE HEN TESTS.

Competitors.	Breed.	A.	B.	C.	D.	E.	F.	Total.
T. Fanning	White Leghorns ...	23	22	20	13	18	8	104
J. Anderson	Red Sussex	24	10	18	0	22	12	86
Mrs. J. Jobling ...	Black Orpingtons ...	22	23	0	14	2	3	64
A. T. Coomber	White Leghorns ...	14	16	6	11	4	13	64
J. Zahl	Do.	14	9	14	11	7	6	61
A. E. Walters	Do.	8	20	5	1	16	6	56
Dixie Egg Plant ...	Do.	19	18	5	0	0	13	55
Kelvin Poultry Farm ...	Do.	6	6	18	0	16	5	51
E. A. Smith	Do.	7	0	4	17	5	15	48
J. H. Gill	Do.	3	17	5	17	1	2	45
J. H. Madrers	Rhode Island Reds ...	0	1	15	19	8	1	44
C. Knoblauch	White Leghorns ...	9	2	6	6	5	13	41
E. F. Dennis	Do.	1	10	4	14	5	4	38
W. L. Forrest	Do.	2	9	10	11	6	0	38
J. M. Manson	Do.	0	21	5	0	2	0	28
W. H. Knowles, junr. ...	Do.	15	7	3	1	0	0	26
E. West	Do.	4	5	0	0	0	16	25
Loloma Poultry Farm ...	Rhode Island Reds ...	9	0	14	0	0	1	24
Miss May Hinze ...	White Leghorns ...	1	0	14	4	0	0	19
J. Macrae	Black Orpingtons ...	0	0	0	0	0	0	0

FINAL REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, 1915-16.

The twelfth egg-laying competition of the Queensland Agricultural College was brought to a successful close on 31st March, 1916. Fifty-three pens competed. As usual, Leghorns prodominated, there being forty pens of white and one of brown Leghorns. Of the other breeds, there were seven pens of Black Orpingtons, two of Silver Wyandottes, two of Rhode Island Reds, and one of Plymouth Rocks. With few exceptions, the results are highly satisfactory. Many of the pens laid a total closely approximating the winners, and it can justly be claimed

that, with a little luck, any one of the leading pens might have taken first place. It must be recognised that luck plays a part. Incidental troubles with warts, moulting, &c., may prevent a pen from gaining first place and so winning a prize! Hence, to be among the leaders in such a competition is a guarantee of high egg-laying capacity equal to that of the actual winners.

Certain features require recognition. Many of the Leghorns are getting very small and weedy. In this there is a grave danger that the stamina of the breed will be undermined through breeding too exclusively for egg production. With the Black Orpingtons some of the pens are not so true to type as could be desired. That these competitions have done a great deal to improve the egg-laying capacity of the various breeds is undoubted. But it is important to preserve the type of the breed; hence in the conditions for our 1917-18 competition more exacting conditions will be imposed as regards trueness to type. As these egg-laying competitions have demonstrated that the lighter Mediterranean breeds are the highest layers, it is unfair to ask the heavier Asiatic breeds to compete on equal terms. One of the 1917 conditions, therefore, will be separate classes and prizes for the light and heavy breeds. This, we think, will do much to preserve such a good breed as Black Orpingtons. The six-hen pen competitions have served a good purpose, but their usefulness at present is mainly confined to demonstrating the quality of the flocks of various breeders. In view of this it seems imperative to insist that those accepted in the competition should be in a position to supply the market with both settings of eggs and young stock. That is, only *bonâ-fide* breeders should be admitted to the six-hen pen test. Another phase of poultry-breeding has been inaugurated at the College for this year's competition. One hundred and twenty pens, each to hold a single hen, have been erected. The object of this is to submit each hen to a year's test for the purpose of selecting the highest producing strain for breeding. This, we are convinced, will go far to still further improve the egg-laying capacity of the various breeds. The eagerness with which breeders seek for inclusion in the single pen test is sufficient evidence of the importance of this innovation. With the inclusion of the single hen test in this year's competition, which commenced on 1st April, 1916, an alteration in the prize list has been rendered necessary. These alterations are as follows:—

In addition to the usual prizes for competition, additional prizes of £3 3s., £2 2s., and £1 1s. will be awarded for 1st, 2nd, and 3rd aggregates for the winter laying, covering the period from 1st April to 31st July. Competitors in the single pen test must enter six pullets under conditions similar to those for the general competition. The aggregate of the eggs laid by the six pullets will render them eligible for prizes

in the general competition, and for this purpose replace birds are allowed. Special prizes of £5 5s., £3 3s., and £2 2s. are arranged for the 1st, 2nd, and 3rd birds in the single pen test. No replace birds will be eligible for these special prizes.

In the competition recently concluded, the total number of eggs laid during the twelve months was 70,848, an average of 1336·75 per pen, or 222·8 per bird. The total value of the eggs laid was £441 6s. 4d., while the cost of feed was £135 12s. 5d., thus leaving a profit, exclusive of labour, of £305 13s. 11d. This is the highest profit we have yet made in any competition, and is largely due to the very high prices at which eggs have sold during the year. Nineteen birds died during the year —one from enteritis, four from liver disease, and fourteen from heat apoplexy or its after effects.

As in previous years, great care has been taken to get the best results possible without unduly forcing the birds. For the benefit of beginners we are giving the average amount of food used each day. It must, however, be distinctly understood that these amounts must not be fed at all seasons of the year. For instance, say it takes 2½ oz. of food per day to keep a hen in good healthy condition when not laying, it will take over 4 oz. to supply her wants when laying heavily, so that you cannot lay down any hard and fast rule as regards the quantity to be fed. To keep the appetite good, without starving, is the fine art of feeding. The following is the average daily ration:—

Morning.—20 lb. pollard, 11 lb. bran, 21 oz. Sunlight oilcake, 24 oz. desiccated meat, or 18 oz. dried blood in place of the last-named. The above were all weighed dry, then mixed into a crumbly mass with water, cold in summer and hot in winter. At night—48 lb. wheat, except once a week, when oats or maize were used to give variety. Oats or maize were also used on Sunday morning instead of bran and pollard mash. The morning meal would average a little over 1½ oz. per bird or 10 oz. for the six birds, while the evening feed averaged 14 oz. per pen, or 2⅓ oz. per bird. At midday a little soup meat, one handful for six birds, was fed about once a week, also green lucerne daily, one handful per pen. The feeding with green lucerne lasted until the beginning of December last, but since then we have had no green feed and were compelled to substitute lucerne chaff, about one-third of a kerosene tin soaked the previous night in boiling water. The latter, although it reduces the quantity of bran and pollard a little, is a poor substitute for green feed, and, in consequence, our records for December, January, February, and March were not up to those of last year. Fresh clean water was given every morning, while shell grit was always available. The quantities mentioned above were for the whole 318 birds. The weather conditions were very erratic, very hot weather being followed by cool changes, while the hot winds, as usual, caused several deaths. During July we had nine consecutive days of cold westerly winds.

Full details of the individual records, allotment of prize money, and balance-sheet of the competition will be found below.

CUTHBERT POTTS, Principal.

Competitors.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Grand Totals.
C. B. Bertelsmeier, Glenelg, S.A.	White Leghorns	117	100	93	118	147	161	164	135	140	131	117	107	1,530
J. D. Nicholson, Arncliffe, N.S.W.	Do.	192	106	110	117	138	147	148	142	130	143	132	115	1,530
A. H. Padman, Pirie street, Adelaide, S.A. ..	Do.	81	133	81	107	140	154	159	141	139	136	133	77	1,481
A. W. Bailey, Red Hill, Brisbane	Do.	66	120	110	133	138	145	151	129	124	125	122	88	1,451
Mrs. J. R. D. Munro, Sunnyside, Warwick ...	Do.	82	110	131	131	140	146	144	135	127	124	102	74	1,446
J. M. Manson, Milton road, Milton	Black Orpingtons	66	94	112	144	149	150	146	131	126	117	113	97	1,445
J. R. Wilson, Eudlo, N. C. Line	White Leghorns	85	100	108	130	142	135	153	135	131	129	112	81	1,441
E. F. Dennis, Herston road, Kelvin Grove ...	Do.	48	108	121	126	140	155	155	135	133	122	110	87	1,440
W. Parker, Sunnybank	Do.	100	31	80	132	139	151	156	134	138	138	134	104	1,437
J. Gosley, Childers	Do.	83	110	115	146	140	150	142	120	129	120	95	83	1,433
King and Watson, St. Mary's, N.S.W. ...	Do.	82	79	126	129	134	140	148	128	115	132	120	96	1,429
Kelvin Poultry Farm, Kelvin Grove	Do.	43	114	123	136	143	149	152	118	112	122	127	88	1,427
J. M. Manson, Milton road, Milton	Do.	61	101	86	120	142	153	159	138	136	140	115	74	1,425
Jas. McKay, Gatton	Do.	122	109	132	144	139	132	130	119	110	102	101	85	1,425
H. Hammill, Kogarah, N.S.W.	Do.	61	93	99	126	146	136	139	124	120	139	140	100	1,423
C. Knoblauch, Hawthorne street, South Brisbane	Do.	68	95	95	108	133	148	147	133	129	127	137	97	1,417
E. A. Smith, Hawthorne street, Paddington ...	Do.	80	50	84	132	151	150	154	138	125	119	125	105	1,413
A. T. Coomber, Brown's Estate, Bundaberg ...	Do.	87	84	102	113	133	145	150	130	129	125	123	91	1,412
T. Fanning, Ashgrove, Brisbane	Do.	97	87	84	116	126	130	143	135	128	139	122	100	1,407
W. Purvis, Glanville Blocks P.O., S.A. ...	Do.	55	77	79	136	138	152	151	128	127	127	127	108	1,405
Moritz Bros., Kalangadoo, S.A.	Do.	56	63	98	123	132	142	143	130	128	139	118	112	1,384
E. A. Smith, Hawthorne street, Paddington ..	Black Orpingtons	23	17	92	150	151	152	157	138	131	126	132	112	1,381
R. Burns, Sladevale, Warwick	Do.	37	49	145	126	148	137	144	120	124	120	118	105	1,373
W. Lindus, Cessnock, N.S.W.	White Leghorns	6	65	103	140	143	147	148	125	131	122	129	113	1,372
O.K. Poultry Yards, Toowoomba	Do.	95	65	92	116	135	151	160	138	125	120	104	68	1,369
T. Fanning, Ashgrove, Brisbane	Black Orpingtons	54	54	119	140	154	147	140	132	112	115	110	78	1,355
J. H. Gill, Cheltenham, Victoria	White Leghorns	44	37	63	116	134	155	160	133	128	139	134	111	1,354
C. T. Clark, Cooper's Plains	Do.	80	80	116	124	130	141	138	126	121	108	108	79	1,351

Competitors.	Breed.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Grand Totals.
Cowan Bros., Croydon, N.S.W.	White Leghorns	53	84	100	117	131	137	151	125	129	135	119	62	1,343
Mrs. Jobling, Plattsburg, N.S.W.	Black Orpingtons	123	128	119	135	135	124	114	102	101	106	93	60	1,340
E. V. Bennett, Kalangadoo, S.A.	White Leghorns	48	106	110	117	129	139	146	126	122	120	103	71	1,337
R. Burns, Sladevale, Warwick	Silver Laced Wyandottes ...	4	87	113	132	143	138	140	117	117	116	117	106	1,330
S. E. Sharpe, Innisfail	White Leghorns	120	88	87	131	141	148	138	112	98	97	73	82	1,315
Geo. Tomlinson, Boonah	Do.	33	68	129	128	134	140	125	119	114	110	122	93	1,315
E. Le Breton, McNab street, Milton	Do.	22	97	123	141	142	142	131	115	105	106	104	81	1,309
F.G. K. Clayton, Blacktown, N.S.W. ...	Do.	50	95	94	122	127	140	149	127	121	110	107	50	1,292
W. Meneely, Freestone Creek, Warwick ...	Black Orpingtons	39	72	118	128	145	131	133	111	111	113	106	79	1,286
R. Jobling, Wallsend, N.S.W.	White Leghorns	57	88	103	128	120	130	146	109	103	114	103	82	1,283
Derrylin Poultry Farm, Mutdapilly	Do.	42	78	84	132	131	133	145	129	101	124	103	71	1,280
Cowan Bros., Croydon, N.S.W.	Black Orpingtons	17	84	93	139	144	134	144	104	113	115	105	81	1,273
J. G. Richter, Aratula, Fassifern	White Leghorns	8	48	104	128	131	144	146	135	127	108	114	74	1,267
S. Chapman, Murphy's Creek	Brown Leghorns	0	24	86	101	117	130	132	137	141	136	133	123	1,260
Loloma Poultry Farm, Rockdale, N.S.W. ...	Rhode Island Reds... ...	26	47	80	107	134	146	145	129	123	121	114	83	1,255
W. Lyell, Graceville	White Leghorns	54	79	86	111	133	137	139	115	106	120	99	65	1,244
C. H. Turner, Aratula, Fassifern	Do.	30	63	93	122	124	142	137	118	102	107	114	82	1,234
J. Zahl, Boonah	Do. (No. 1)...	34	57	75	136	125	145	151	122	108	101	99	75	1,228
J. Zahl, Boonah	Do. (No. 2)...	53	74	71	110	123	125	127	115	117	105	106	75	1,201
F. Clayton, Blacktown, N.S.W.	Rhode Island Reds... ...	0	1	62	124	134	140	143	123	112	125	119	103	1,186
R. Jobling, Wallsend, N.S.W.	Silver Laced Wyandottes ...	71	85	104	111	124	121	120	98	97	100	79	66	1,176
J. Aitcheson, Oxford street, Paddington ...	White Leghorns	18	90	123	96	115	127	137	124	105	102	89	46	1,172
E. Pocock, Palmer street, Windsor	Do.	31	52	64	100	133	144	144	118	110	100	99	59	1,154
W. H. Forsyth, Willoughby, N.S.W.	Do.	15	23	27	102	125	141	145	133	128	130	98	73	1,141
J. R. Johnstone, Warwick	Plymouth Rocks	0	0	0	85	111	121	121	121	105	93	84	30	871
	Totals	2,936	4,049	5,147	6,563	7,176	7,500	7,630	6,654	6,364	6,360	5,962	4,507	70,848

The following prize money was allotted to competitors: —

	£ s. d.	£ s. d.
C. B. Bertelsmeier, c/o Mrs. Vincent, Byron st., Adelaide, S.A.—		
One-half first and second prizes	5 15 6	
Monthly prizes, September and October ..	1 0 0	
		6 15 6
J. D. Nicholson, Lona, Flora st., Arncliffe, N.S.W.—		
One-half first and second prizes	5 15 6	
Monthly prizes, November and January ..	1 0 0	
		6 15 6
A. H. Padman, 46 Old Exchange, Pirie st., Adelaide, S.A.—		
Third prize	2 2 0	
Monthly prize, May	0 10 0	
		2 12 0
S. Chapman, Premier Stud Poultry Yards, Murphy's Creek, monthly prizes, December and March		1 0 0
Mrs. J. H. Jobling, Plattsburg, N.S.W., monthly prize, April		0 10 0
R. Burns, Sladevale, *viâ* Warwick, monthly prize, June		0 10 0
E. A. Smith, Hawthorne st., Paddington, monthly prize, July		0 10 0
T. Fanning, The Gap, Ashgrove, Brisbane, monthly prize, August		0 10 0
H. Hammill, Kogarah Bay, Kogarah, N.S.W., monthly prize, February		0 10 0
Total prize money awarded		£19 13 0

BALANCE-SHEET.

RECEIPTS.

	£ s. d.	£ s. d.
Entry Fees, 61 at 10s. (eight withdrawals) ..	..	30 10 0
Sales—		
Orient S.S. Co., 744 dozen	43 8 0	
Barnes and Co., 3,644 dozen (net) ..	247 15 6	
College Dining Hall, 1,516 dozen ..	119 12 10	
		410 16 4
Total Receipts		£441 6 4

EXPENDITURE.	£ s. d.	£ s. d.
Prize Money		19 13 0
Food—		
Wheat, 249 bushels	84 12 7	
Oats, 6 bushels	1 12 2	
Hulled Oats, 6 bushels	3 15 0	
Maize, 9 bushels	2 12 6	
Bran, 158 bushels	10 11 2	
Pollard, 303 bushels	22 19 8	
Oilcake, 5 cwt.	3 3 0	
Bone Meal, 1 cwt.	0 13 6	
Desiccated Meat, 2 cwt.	1 16 0	
Dried Blood, 1½ cwt.	0 15 0	
Green Lucerne	1 10 0	
Chaff, 3 bags	1 1 10	
Soup Meat	0 10 0	
		135 12 5
Net Profit on Competition	.. ..	286 0 11
		£441 6 4

HORSE WITH SORE SHOULDERS.

In the rush of field work much inconvenience and delay to the farmer, and excruciating pain to horses, may be prevented by care of the necks and shoulders. An improperly fitted or lumpy collar often causes a bruise, which later breaks into a running sore. A hard core or kernel is formed, which must be removed before this sore will heal. Often young or excitable horses will bruise themselves, even when supplied with well-fitting collars, by jerking, jumping, or uneven pulling. Some horses seem prone to collar sores, and must be carefully watched to avoid this troublesome injury. To prevent is more easy than to cure. Harden the neck and shoulders by bathing several times a week with salt water or vinegar in salt water. A little alum may be added. As a substitute for the old oakbark solution, try tannic acid dissolved in glycerine. This toughens the skin by tanning it.

When a sore begins to appear, which is usually characterised by a slight swelling, very warm and painful, do not work the animal for a day or two, if possible. If the horse cannot be spared, make a well-fitting felt pad, with the centre cut out, and place this over the injury. Healing powders, or ointments, such as zinc oxide, boric acid, sulphur and lard, or carbolated vaseline, may be used. If a watery serum runs from the sore, equal parts of tannic acid and powdered alum will prove efficacious. Severe caustics, such as blue vitriol, and the like, very often make the condition worse. Only soothing medicines should be used, allowing Nature full sway. If the shoulder becomes covered with sores, it is because they are contagious, the germs being found in the pus. A good blood tonic is often needed, and in bad cases the services of a competent veterinarian.—" Town and Country."

The Orchard.

A NEW BANANA PEST IN JAMAICA.

On a plantation in Upper St. Andrew, situated on the banks of the Wag Water, an insect pest has turned its attention to bananas, and apparently found conditions so congenial that it has adopted the banana stems and roots for its home and for its feeding ground, and for bringing up of its family.

A whole four-acre piece was found to be practically riddled by these borers and their larvæ. The borers are small beetles—weevil like, and the larvæ, which are hatched and fed in the banana bulbs and lower part of the stem chiefly, are of the same nature as those common in rotten wood, usually called "Makakas"—large fleshy grubs. Bananas were also found attacked in other fields on the same property and in other fields of small settlers in the same valley up the streams.

We understand that this weevil has been known for several years at Hope Gardens as infesting bananas without apparently doing much damage until very lately. It remained for the Entomologist, lately entered on his duties, to notice this borer, and recognise its similarity to a banana borer which has caused great loss in Fiji.

Inquiry elicited the fact that the borer was causing the death of bananas at Temple Hall Estate, in St. Andrew. A visit by the Entomologist there discovered that it was a very serious pest, requiring instant treatment, and he reported so. A few days later the writer visited the place, and instantly formed the opinion that it was such an alarming pest that measures to control it should not be delayed, and reported so.

Acting under the Protection from Diseases in Plants Law, 1915, the Department of Agriculture has taken the pest in hand.

All the agricultural instructors were at once informed of this pest, and asked to keep a lookout for it. We hope it will be localised—that is, prevented from spreading out of the valley of the upper waters of the Wag Water. But it would be easy for such a pest to get down the river to St. Mary.

The following is part of the Entomologist's report:—

"*Injury.*—The eggs of the beetle—a black weevil half an inch long—are deposited on the banana at the ground level, and the grubs commence boring into the leaf sheaths and bulb, these presenting the appearance as if riddled by shot. Generally the borings are confined to the basal part of the plant and bulb, especially the latter, but in instances the workings may extend 2 to 3 feet up the stalk. Plants in all stages are attacked, from the youngest sucker to the mature bearing plant. The grubs may invade the buds and young suckers from the parent

plant, in which case the younger generation of plants is lost. Established plants, if attacked, may be killed off before the bunch is produced, and if produced it is of small unmarketable size."

* * * * *

"The Fiji borer of the banana of the same genus (Sphenophorus) but a different species, has cost the growers of that colony thousands of pounds during the past ten years it has been with them, and it ultimately was found necessary to dispatch the Government Entomologist at considerable expense to Java, the original home of the pest, with a view to introducing natural enemies of the borer."

It is possible that a natural enemy could be found here; that would form the subject of inquiry and experiment. Whether the first treatment that suggested itself with lime will prove effectual will be known by the time this is read."—"Journal of the Jamaica Agricultural Society" (January, 1916).

"THE CYPRUS AGRICULTURAL JOURNAL."

We have for some time been in receipt of the "Cyprus Journal," from which we have from time to time published extracts on agricultural products of the island, of interest to agriculturists and fruitgrowers in Queensland. The journal, we are notified, will in future be issued as "The Cyprus Agricultural Journal," and will be published in January, April, July, and October, on or about the 15th of the month.

In the issue of January, 1916, the following hints to olive growers in Cyprus will be of value to olive growers in Queensland:—

1. Most olive growers in Cyprus are entirely ignorant of the proper methods of cultivating, pruning, and manuring olive trees and of combating the diseases which attack them. This in many cases is not for want of advice and instruction given them by the experts of the Agricultural Department. If only the more progressive farmers could abandon the fatal practice of gathering olives by beating their unfortunate trees with a stick (vaklisma), and if they would cease from pressing the olives when in a rotten, acrid, dirty condition, a distinct improvement would be made. This latter practice, which is almost universal in Cyprus, produces oil fit often only for lubricating purposes.

2. The old-fashioned process of piling up the olives in damp and dirty places should be abolished utterly, for by this system not only is the oil produced of very bad quality, but the yield is also diminished.

Olives should be gathered not by beating with a stick but by hand or with a special rake having wooden teeth (specimen of such I have given on several occasions in olivegrowing centres). The olives should be taken at once to the olive press. If this is too busy (as often happens) they should be kept not in heaps but in thin layers 8 to 15 c.m. thick, in places well ventilated, and should be turned over daily.

3. The olives, if healthy and kept under such conditions, considerably increase their oil contents while maturing in the store.

4. Any difficulty owing to insufficient room can often be overcome by the use of mats or trays such as are employed in the case of silk worms.

This method, apart from economising space, places the olives under the best conditions for preservation, and when these mat-layers are not too large, say, 1 m. 50 cm. long by 0·75 cm. broad, they greatly facilitate the handling, *i.e.*, the turning over, of olives, transport, &c. They are very inexpensive, and in the majority of cases must be regarded as indispensable, and their small cost will be very soon repaid out of increased profits, as they will certainly improve the quality and quantity of the olive oil produced.

Horticulture.

THE CULTIVATION OF CALADIUMS.

Mr. J. F. Bailey, Government Botanist, in replying to a resident of Port Douglas on this subject, says he understands that caladiums grow all the year round in that part of the State, and if it should be desired to dry them off, it would be advisable, after full growth has been maintained during the summer, to (say, in the cooler time of the year) gradually reduce the watering until the leaves all die away. Turn the pots on their sides and keep in a fairly dry position. While growing, abundance of water should be provided, but provision should be made for efficient drainage. Waterings of liquid manure once a week will be beneficial. For growing the bulbs we find a mixture of the following very satisfactory:—Turfy loam (chiefly), leaf mould, sand, cow manure, with a sprinkling of bone dust and soot (the latter brings out the colours). Different colours may be raised from seedlings obtained as the result of cross-fertilisation, either by hand or by natural agency.

PROPAGATING BOUGAINVILLEAS.

Cuttings from the previous year's growth of most varieties strike readily during the spring, but layering is the surest method.

Pieces of the thickened portions of the root also furnish plants. Notice how the suckers from such keep springing up when the portion above ground has been removed.

Forestry.

TREES AS WATER CONSERVERS.

The following paper by I. M. Sim, Honours Diploma in Forestry, on Forest Conservation, published in the "South African Farmers' Advocate" in October, is another valuable addition to the scientific literature on Forestry, which subject is to-day engaging the earnest attention of various Governments the world over. Such papers are of great value to us in Queensland as well as to European and to the United States Governments. We have frequently advocated the conservation of existing forests as well as the reafforestation of denuded areas in our State, in the interests not only of posterity but of our present day agriculturists and pastoralists. The denudation of our timbered areas—especially scrub lands, for agricultural purposes, and the consequent diminution of rainfall in such areas, has been the theme of many of our articles on Forestry in this Journal, and it has been pointed out how this serious result of clearing lands for agricultural purposes has proved to be injurious to those settlers who, for a time, benefited by the removal of the timber. This paper, showing, as it does, that the predecessors of the present inhabitants of South Africa were responsible for the treeless dry areas of that country, should surely be considered as a warning in time to the States of the Commonwealth of Australia.

Mr. Sim here shows how to combat certain destructive processes, how increased precipitation may be induced, and run-off minimised in the following words:—

The inhabitants of South Africa have to ask themselves in how far they and their predecessors are responsible for the fact that South Africa is for the most part a treeless and dry country. We have abundant proof that it was not always so, both in the naming of places—now semi-desert—by the early settlers and by the records left by the missionaries and writers of the early days of South Africa. For instance, the naming of places such as the Bloemfontein and Wildfontein show that, at the time these names were given, the flora must have been very different from that of to-day. Such examples of names, denoting a plenty of water and of flora are to be found throughout what are now some of the driest districts of South Africa; in the Cape Karroo, in the Free State, and in Bechuanaland.

In the archives of the Cape are to be found numerous "placaats," prohibiting the felling of timber on the Cape Flats, around Paarl and Worcester, and even further north towards Saldanha Bay. Dr. Moffatt, that veteran missionary of Griqualand, describes the forest existing even in his time near what is now Kimberley. Rains then were plentiful and reliable. To-day all is different. The herbage has been largely

destroyed, the ground surface is parched, and, as a consequence, the rains are less in volume and are irregular. When they do come, owing to the bare-ground surface and the streambeds being unimpeded by herbage, they flood the rivers and run to waste.

PLANTS AND PRECIPITATION.

Now it has been proved that there is an intimate connection between the plant life of an area and the precipitation and retentive power of that area. First, as regards the precipitation on an area, it is found that rainclouds are either attracted or repelled by the condition of the ground-surface. This is chiefly due to the amount of heat radiated by the ground. Clouds, or in their initial condition rather aircurrents laden with moisture, strike an area. Whether or not the moisture in the air is deposited depends on the heat of the ground struck. If this is warm—at any rate, warmer than the air-current—the result is the expansion of the air forming the current, and in the expanded condition it can hold more vapour and therefore will deposit none of what it originally had.

But, on the other hand, if the surface struck is cooler than the air-current, the result is the reverse. The volume of air is reduced and in proportion its water-carrying capacity is diminished. The vapour in the air-current is condensed and it primarily assumes the form of a visible cloud; it is then precipitated as mists and gentle rains. The problem at this stage then is to get the ground surface into the cool condition which induces gentle precipitation.

There are only two means by which this can be done; firstly, by having the surface so shaded by herbage as to be always cooler than the surrounding air, and secondly by having it, if bare, in such a condition that it is able to absorb and conserve moisture when precipitated and to evaporate it slowly but continuously when no precipitation is taking place: Ploughed land is an example of this condition.

The first of these means—the ground surface so shaded as to be constantly cooler than the air coming in contact with it—is the means devised by nature for inducing and retaining regular precipitation.

Naturally the country throughout even the present driest parts of South Africa had the ground-surface covered with vegetation. Forest was much more plentiful than it is to-day and savannah (single trees scattered amongst grass) and grass-land existed where there were no forest. The result was gentle and frequent rains. But this was a condition man could not permit to exist. The forests have been cut down, light let in and water drained off, and, as a consequence, the temperature of the forest areas has risen. The trees on the savannah areas (our thornvelds) have been cut for firewood and the grass has been burned until areas, once useful, productive thornveld, have been turned into korroo-veld with a depleted rainfall.

But so far I have only dealt with the precipitation of rain. For the air-currents to precipitate that rain they must receive the moisture from

somewhere. A large percentage is, of course, obtained from the sea, but the final saturation moisture is received from the land. To give off this moisture the ground must first have had it to give. Now the absorbing power of ground depends on the surface and on the free or restricted flow of water in the streambeds. It is in this connection that the greatest evil of veld-burning bears fruit. Fires, since the time of the first sighting of South Africa by the Portuguese navigators, have been of annual occurrence. The result, apart from the destruction of the herbage, has been the rendering of the ground-surface into a condition in which water cannot be absorbed.

To briefly deal with this question of the power of absorption of the ground being destroyed by fire, it must be remembered that the natural herbage performs a double function. The leaves shade the ground and by thus keeping it cool tend to induce the precipitation of rain, and the roots and dead leaves, mixed with the soil, form a layer of spongy humus which absorbs deposited moisture and prevents too rapid evaporation.

But the annual grass fires not only temporarily destroy the foliage and even the veld—this is a separate subject which cannot be gone into here—but they burn out and destroy this spongy layer of humus and bake the ground-surface, rendering it practically impervious to rain. From it deposited moisture rushes off to the nearest spruit or river. Every Kaffir and sheep track acting as a drain, the result is obvious.

The next point is to deal with the streams themselves. These, in the first instance, were all running, supplied by the stores of water absorbed by the spongy layer of humus. But, when this humus was destroyed the supply of water was reduced. If this reduced supply of water was to continue to flow it was at least necessary for the evaporation to be reduced to a minimum. Instead of this, grass fires destroyed the scrub and other herbage along the banks and exposed the banks and increased the evaporation; for, it must be realised, the evaporation from an open stream with exposed banks is several times greater than that from a stream with trees, scrub, and undergrowth along its borders.

Not only is the evaporation increased by the destruction of the stream-bank herbage, but a second evil is brought about. With herbage on the banks a certain amount of resistance is offered to the flood waters, allowing these waters to soak in and lessen their velocity. With unimpeded banks, the water runs to waste too rapidly for any soakage to take place or for any good to be wrought to the country.

Now all these desiccating processes—and many others which it is impossible to deal with in detail in such an article as this—have been brought about by the destruction of herbage. The question that arises then, is how these destructive processes can be combated, increased precipitation induced, and the run-off minimised. There is only one method and that is by proper and suitable reclothing with herbage the

bared areas. The first step should be the absolute prohibition of grassfires, for with them as an annual menace, no permanent good can be brought about. Australia, the United States, and other countries have imposed the severest penalties on grass-burning. Once this is put down, the greatest cause of desiccation in South Africa would be abolished. Nature would slowly tend to reassert herself and to improve the water supply. But we cannot afford to wait for the natural processes, we must assist nature and this assistance must take the form of suitable reafforestation.

REAFFORESTATION.

What is suitable reafforestation? The three primary necessities are all I have room to touch on here. They are—

1. Entire conservation (not biassed by political aims) of our indigenous forests.

2. Reafforestation of the mountains—since they are first struck by the air-currents containing moisture—with suitable humus-producing trees, such as pines and cypresses.

3. Entire protection and, if possible, reafforestation of our stream-banks with suitable trees and shrubs. These must be species with a minimum of evaporation, and in this respect our indigenous shrub, Buddlica (Zalichout), Rhus, Combreyhim, Cunonia, Enythrima and many others are of the first value.

Through the limitations of space, I am only able to touch the fringe of a great subject in this article, but the outlines are sufficient to show how South Africa, the land loved by all her inhabitants, is suffering by desiccation which can be prevented. It is our duty both individually and collectively to convert the present processes of deterioration into processes of the greatest improvement for our land.

SALE OF MAMMOTH CHEESE.

In the December issue of this Journal we described, as the largest cheese ever made, one from Lawrence County, New York, which was sent to the Panama Exposition at San Francisco, the weight of which was given as 6 tons. A cheese made in Canada in 1892 weighed 22,000 lb. net, or 11 tons. A big New York State cheese, weighing 1,200 lb., exhibited at the Panama Exposition, was recently cut and sold. The receipts totalled between £600 and £700. So says an exchange. There must. however, be some mistake about the weight and returns from the sale of this cheese. First of all, it was by no means the largest cheese ever made, and secondly, in order to realise £600, it must have been sold at the rate of 10s. per lb. We have no information as to what the 6-ton New York cheese, if sold, realised, but at 10s. per lb. the result would have been £6,720. There must be a mistake somewhere.

Tropical Industries.

DESTRUCTION OF SUGAR-CANE PESTS.

A New Moth Pest.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from Mr. Edmund Jarvis, Entomologist to the Bureau:—

The month has been devoted almost exclusively to the study of an important branch of control applicable to the grub stage of cane-beetles, which aims at the discovery of some simple yet effective method of destroying them whilst in their earlier stages.

It is satisfactory to be able to state that experiments conducted during March, and those now in hand, have been attended with marked success, and I hope very shortly to be in a position to report details of a discovery that may prove to be of economic value.

It will be of interest to mention the occurrence at Meringa and Gordonvale of a new moth-pest of sugar-cane hitherto unrecorded. Early in the month thousands of slender greenish-brown caterpillars were noticed stripping the leaves of both young and old stools, often to the mid-rib, over areas of considerable extent. This damage was confined principally to plantations on which weeds had been allowed to mature, these having no doubt served to attract the moth in the first instance. Apparently the caterpillars had quickly forsaken native food-plants and turned their attention to cane leaves as being perhaps more palatable than the foliage of smaller grasses and weeds. A number were collected for breeding at the laboratory, and in due time pupated on the leaves, the pupa being concealed in a short tube previously constructed by the caterpillar by webbing together the opposite edges of a leaf-blade. Contrary to expectations, very few were parasitised, fully 90 per cent. yielding moths and the remainder specimens of a tachinid fly, but no hymenopterous parasites. The perfect insect, which measures about 1½ inches across the expanded wings, is slaty-brown with a darker stripe bordered by light gray—very conspicuous in the male—running obliquely from apex to hind margin of fore wing; and has two suffused smoky bands crossing the centre of hind wing and parallel to its outer margin, the one nearest the edge terminating in a dark blotch on the upper angle. Dr. A. J. Turner, of Brisbane, who has identified this insect as *Mocis frugalis* Fab., tells me that it is a widely distributed species ranging from Port Darwin to Sydney, and occurring also in many other parts of the world.

Its appearance at Gordonvale in such numbers may, I think, be attributed to the recent drought, which has temporarily upset the balance of nature, thereby affecting the normal rate of increase of many kinds of parasitic and predaceous insects.

The familiar little black ant (*Pheidole megacephala*), for example, has received a severe check in certain localities near Gordonvale. During the earlier months of last year it proved a veritable pest at the laboratory, necessitating the use everywhere of ant-proof tables; while outside among stools of cane and in land under "blady grass" it swarmed literally in millions, its nests being so numerous that scarcely a square yard of ground remained uninfested.

It occurred more or less freely, too, in canefields, where, by devouring injurious caterpillars, &c., it probably helps to thin the ranks of more than one of our many enemies of sugar-cane. Few insects escape the attacks of this cosmopolitan voracious foe that systematically explores every plant, hole, and crevice in search of prey. Since the drought, however, not an ant is to be found in the laboratory building, and they have practically disappeared from the soil under cultivation.

FIFTY MILLIONS A YEAR.

Under this caption the Federal Sugar Refining Company have published an advertisement in the Washington "Herald," in which the argument is made that a consumption tax should be levied on sugar that would increase the Government's revenues 50,000,000 dollars.

The idea of singling out sugar for a consumption tax, or for an excise duty, has no parallel except that of the war tax levied on baled cotton during the civil war*. A war tax of a cent a lb. on cotton on the 5,000,000 bales of cotton consumed in the United States would produce a revenue of 250,000,000 dollars. A tax of a cent a lb. on wheat consumed in the United States would produce something like 300,000,000 dollars, and at the same time would leave those products untaxed for export.

There is no reason why sugar, or cotton, or wheat, should be taxed, but if they are taxed, then they should be all taxed similarly. We should say that no Government on earth would undertake such taxation unless it were one of the expiring efforts of the young Turks, or of the enterprising Japanese.

The Federal Sugar Refining Company has been carrying on this sort of propaganda for many years, apparently to spite the American Sugar Refining Company, their chief opponents in the sugar refining business, and yet their coadjutors in their monopolistic control of the New York sugar market. Wealth, as well as poverty, brings together some strange bedfellows, and the New York combination of the American Sugar Refining Company, the Spreckels interests, and the Arbuckles form a combination that has been making an immense amount of money out of the sugar producers. Their efforts have depressed the prices of

* This is obviously an error. Excise was levied on all sugar produced in the Commonwealth of Australia between 1901 and 1914. The rate was, at first, £3 per ton, and was later increased to £4. Excise was charged on the refined product.—Ed. "Q.A.J."

sugars so far in the western world that they have reached about a cent a lb. below the normal level, and the Philippine sugars produced in the Far East have found a better market for sugar at home, in the Far East, rather than to send them to the United States to be admitted free of duty and thus gain the cent a lb. advantage that they would secure in that way. These parties, the New York combination of buyers, apparently have at times their differences among themselves, but join hands with singular unanimity when it becomes a question of price for the producers of sugar.

In the sugar trade the report has been circulated, so we have been informed, that the Federal Sugar Refining Company could scarcely turn out as fine sugars as the American Sugar Refining Company, and therefore at times was discriminated against by discreet buyers because of the lower quality of their sugars of the same official grade. Whether this was exactly true or not we are unable to say, but evidently there is some element of discord existing among these three central figures of this great monopoly that has only been broken into now by the New York sugar future market, into which millions of money will enter when sugars are forced below what seems to be fair prices.

In regard to the revenue duties derived on sugar, which are now of such great importance to the Federal Government, these gentlemen advocating the imposition of an excise, or consumption tax, are unquestionably aware that the English Government has refused to do anything of the kind in connection with the Cantley beet sugar factory in Northern England. The import duties on sugars have recently been considerably advanced in England, and not one word of opposition was heard from any one in Parliament against letting the Cantley factory derive whatever benefit it could from the incidental protection that the sugar duties allow them. France and Germany allow their colonial sugars similar advantages, and we feel sure that Congress will see through the disreputable machinations of the employees of the Federal Sugar Refining Company in the literature that they have been circulating, as well as in the Washington advertisement hereinabove referred to.—"Louisianna Planter."

ACETIC ACID AND THE RUBBER INDUSTRY.

Although numerous other methods have been suggested and tried, it is a fact that 99¾ per cent. of all plantation rubber is coagulated with acetic acid. The acetic acid is added to the strained latex, which is then poured into the coagulating vessels. "Considerable alarm arose among rubber planters" (says the "Fiji Planters' Journal," April, 1916, quoting from the annual report of the Director of Agriculture, Ceylon, 1914), when on the outbreak of war it was realised that supplies of acetic acid, almost all of which came from Germany and Austria, were likely to run short, Mr. Campbell, who was at that time Acting Government Chemist, immediately began investigating the question of being able to provide acetic acid or some substitute locally, and numbers of private investigators also set to work on the same problem. Cocoa

juice, cocoanut water, and cocoanut vinegar were all found to be suitable coagulants, especially cocoanut water, which is now being regularly used on some rubber estates. At Peradeniya, pyroligneous acid from the destructive distillation of wood and of cocoanut shells was produced by an improvised still and the results made public. Supplies of acetic acid soon began to arrive from England, and the urgency of the question passed, but results which will probably prove of permanent benefit to the island remain. Acetic acid can be made cheaply and in ample quantity from cocoanut shells. It is not sufficiently clear in colour for the coagulation of rubber that is to be made into first latex crepe, but good, clear smoked sheet can be and is being made in large quantities with it. Ceylon produces enough cocoanut shells to provide sufficient acid for all the smoked sheet made in the island—perhaps in the whole East—and I think our resources in that respect may very likely be turned to good account.

The cost of acid works out at much less per lb. of dry rubber with crude acetic acid prepared from cocoanut shells than with the imported product. Mr. Bamber has shown that considerable economy could be effected by using acetic acid prepared from cocoanut shells over the imported product. He calculates that the cost of acid per lb. of dry rubber is 0·08 cent in the case of the crude product, as compared with 0·39 cent to 0·65 cent when ordinary acetic acid is used.

TOBACCO.

The following interesting paper on Tobacco-wilting, Curing, Fermentation, Chemical Changes, &c., was read before the Board of Agriculture, Jaffna, Ceylon, and appeared in the "Tropical Agriculturist," Ceylon, for March, 1916:—

WILTING.

The wilting of tobacco which takes place immediately after harvesting is due to evaporation, and is not strictly a part of the curing process. Although thorough wilting hastens the curing practically no chemical change is produced in the leaf. In fact, plants often become wilted during the heat of the day in the growing season.

CURING.

Tobacco curing, in the broad sense of the term, implies all the changes which take place in the curing shed, fermenting house, or ageing room. The term, as it is ordinarily used by tobacco growers, refers only to the change which occurs in the curing shed.

Certain requirements must be met in order properly to cure tobacco by any method. The leaf must be sufficiently ripe and in sound condition. Any portion of a leaf that has been killed by excessive evaporation, bruised, sunburned, or subjected to poisonous gas, can never be properly cured. It is therefore a life process, and the plant must be kept under suitable conditions as regards heat and moisture, to prolong life as the curing proceeds. At a temperature as low as 60 degrees

Fahrenheit, curing practically ceases, though evaporation may continue, if the curing shed is too open, during dry or windy weather. At a temperature of 130 degrees Fahrenheit, the plant life is killed. There is little danger of extreme temperature in Ceylon, but these facts should help us to understand that the curing is a life process, and amounts to more than the mere drying of the leaf, which could easily be done outside this range of temperature. It is also quite possible to cure the leaf without sufficient drying, in which case, pole sweat, stem rot, or mould, are apt to develop. If tobacco is too closely crowded in a room, and the stems of the leaves become brittle, it is an indication that pole sweat is about to develop. The tobacco should immediately be more widely spaced in the barn, and more ventilation given. If, on the other hand, the tobacco is drying too rapidly, and becoming crusty and crisp, prior to browning, the curing shed should be more tightly closed. If necessary, the floor should be sprinkled with water or the tobacco crowded more closely. Tobacco loses from 12 to 30 per cent. of dry matter during curing. Tobacco cured on the stalk always loses more in weight, sometimes twice as much as it would lose when harvested by the single leaf method. This, though contrary to the general belief, is a proved fact.

The curing process is variously modified according to the use for which the leaf is intended, the difference in procedure pertaining chiefly to the rate of drying; this, in turn, is controlled mainly by the use of artificial heat. The character of the cured product is greatly modified by these different methods, and it is necessary to consider separately those cured with, and those cured without, the aid of artificial heat. The most widely practised methods are air-curing, sun-curing, flue-curing, and open fire-curing.

The curing may be divided into two periods: during the first the leaf remains alive, while in the second, the changes which occur have no connection with its life activities.

Practically all the cigar tobaccos and the immense quantities of White Burley tobacco are cured without the use of artificial heat, or by what is known as

AIR CURING.

After harvesting, the tobacco is hung up in an enclosed roomy shed where the leaf undergoes a slow process of *starvation*, unless it is killed by bruising, heat, or by too rapid drying. Of course, the leaf must have food in order to remain alive, and this comes from the reserve supply which has been stored up. The ripe leaf is very rich in starch, and one of the important changes in the curing is the disappearance of most of this starch, which is consumed by the living portion of the leaf itself. If the leaf is prematurely killed there is no means of removing this starch, and the tobacco is harsh, lifeless, and strawy. After the starch is nearly all used up, it is probable that some of the nitrogenous constituents are attacked as a last means of prolonging the life of the residual living matter.

Along with these changes in composition, the green colour is replaced by a lemon yellow. This is a characteristic of all tobaccos, whatever the curing method may be, if properly conducted. The green

colouring matter, called chlorophyll, is peculiar to all plants, in very similar, but not identical forms. During the period in which the leaf tissue undergoes starvation, this green colouring matter is more or less completely changed into colourless substances and the appearance of the yellow colour marks the approaching death of the leaf, the yellow colour indicating the end of the first period of curing.

In the second, the changes which take place are not dependent on life process, and are quite different from those occurring in the first stage. They consist mainly in the further breaking up of the products formed in the first stage. One of the most important changes is the brown colour, formed by a process of oxidation, which takes place after the cells are dead. As soon, therefore, as portions of the leaf die, they at once begin to turn brown, provided sufficient moisture is present. The two essentials for the development of the brown colour are a supply of oxygen from the air, and sufficient moisture. If the drying has proceeded too slowly and excessive moisture is still present, development of the brown colour will proceed too far, causing the leaf to cure dark.

The most favourable temperatures for air-curing are between 70 and 100 degrees Fahrenheit, and the relative humidity should be about 85 per cent. Under these conditions moisture will gradually lessen and the curing will proceed smoothly.

SUN CURING

is used in few localities as a modification of the air process employed for curing certain types of plug or chewing tobacco, by being hung on scaffolds and exposed to the sun for several days. It is then transferred to the curing shed and finished off by the regular air method. This method has not been investigated.

FLUE CURING.

The distinctive feature of the flue method is that the curing shed is constructed as nearly airtight as possible, and provided with a system of large pipes or flues, diffusing heat which is completed within a few days, the object being to prevent smoke from coming in contact with the tobacco.

Heat is applied immediately after the tobacco is hung in the barn and rapidly increased to about 100 degrees Fahrenheit. At this temperature the tobacco yellows very rapidly, provided sufficient humidity is maintained. As green tobacco contains about 75 per cent. of water, which is constantly being given off, it is easy to keep the air moist under this temperature, if the barn is sufficiently tight. When the tobacco is almost completely yellowed, the temperature is rapidly increased, finally reaching 175 or 180 degrees when the curing is completed. At the same time ventilation is provided, in order to bring about a rapid drying which will kill the leaf and fix the yellow colour. If not done at this stage the leaf would turn brown, and resemble in

colour, tobacco cured by the other methods. The killing of the leaf in this process before the yellowing is completed, fixes some of the carbohydrates in the leaf, and when the high temperatures are reached these give a sweet smell and flavour.

One of the principal factors is the bright lemon yellow colour, and the two prime conditions are the right kind of soil and proper control.

FIRE CURING

is universally adopted in heavy export or shipping tobaccos. The tobacco is hung in a moderately tight curing shed and allowed to begin yellowing before applying heat. Slow wood fires are started on the floor beneath and gradually increased in intensity as the curing proceeds. The entire process takes from one to two weeks and cures a dark brown leaf.

The tobacco is exposed to the smoke from the open fires and consequently it acquires a characteristic flavour and odour. The creosotic substances absorbed from the smoke possess antiseptic properties and prevent injury to the leaf in shipment to foreign countries.

FERMENTATION.

In the general understanding of the term, only cigar tobaccos are fermented. The fermentation is of great importance and the curing process must be conducted with the idea of developing oxidising enzymes, upon which largely depends the success of the fermentation. In the curing of cigar leaf an attempt should be made to have the leaf become dry, and brought in case, once in twenty-four hours, when the curing is nearly completed. More of the oxidising enzymes are formed in the ribs of the leaf than in the tissues, and the alternate drying and moistening of the leaf brings about a movement of the contents of the ribs out into the leaf web. The longer the ribs and stem are permitted to live the greater will be the amount of enzymes formed.

Fermentation develops the aroma of the tobacco, depending mainly on quality of leaf and the skill of the operator to regulate that fermentation. 23 to 24 per cent. of moisture ensures proper fermentation; a higher per cent. causes liability to decay, and may result in failure. The proper condition is soon learned by experience and the pliability of the leaf to touch is the only test.

Several methods of fermentation are practised but fermentation in bulk is the most modern and widely practised. Rooms heated with steam and kept at a temperature of from 75 to 80 degrees Fahrenheit with humidity maintained at 80 to 90 per cent. and even as high at times as 100 per cent. are best. Different grades of tobacco should be bulked separately and given different treatment. For example, wrapper leaves of light shade must not be fermented so heavily as the filler leaf, as they will become too dark. Fermentation varies according to the presence of oxidising enzymes.

From 3,000 to 5,000 lb. of the light grades, 8,000 to 10,000 lb. medium, and 10,000 to 30,000 lb. ordinary fillers, are the average bulks. The greater the fermentation desired the greater the per cent. of moisture allowed when bulked. The wrappers are therefore in a somewhat drier condition than the fillers. These bulks may be from four to five feet wide, from four to eight feet high, and of any length. The bulk should be made on a platform raised a few inches from the floor. The butts are placed toward the outside of the bulk, the tips toward the centre. The first row is laid with the butt ends even with the edge of the bulk, the second, butts resting on about one-third of the tip ends of the first, and so on with the third row. Three rows in from each side, or six rows in all, is as much as will ordinarily be required for each layer. A perforated tube is placed in the centre, one end being left exposed at the side, into which a thermometer can be inserted. The temperature should be watched very carefully, especially during the earlier stages of the fermentation. When the bulk is completed, it should be covered with canvas blankets, or rubber sheeting. No weights should be placed on the bulk, when the fermentation is being done in a properly constructed room; the idea being to leave sufficient space between the layers to permit the escape of undesirable gases which are formed during fermentation.

The temperature will begin to rise in a short time and continue to increase at the rate of from 5 to 15 degrees a day, depending on the percentage of moisture present, until the temperature reaches 130 degrees, when the bulk must be broken down and rebuilt. In rebuilding, the tops and sides of the old bulk should form the centre of the new. Each bunch should be given a shake to free it from any of the objectionable products of fermentation, and to lessen the liability to rot and mould. The temperature of the tobacco will be lowered in handling to about the temperature of the room. The bulk will again heat up but not so rapidly, perhaps, as the first bulk. In eight to twelve days the thermometer will indicate that the pile has reached a heat of 125 or 130 degrees, or that, perhaps, it has ceased to rise in temperature and remains stationary. In either case the bulk is to be rebuilt.

This process of bulking may have to be repeated several times, or until the best possible aroma is obtained. If the process be carried too far, the desirable products obtained in the earlier stages may be destroyed and the tobacco rendered unfit for smoking.

AGEING.

Ageing may be described as partly a process of slow fermentation and partly an oxidation of leaf contents without the agency of enzymes. It softens and mellows a tobacco, taking away its rawness and bitterness, as well as disagreeable odours, and improving both the aroma and burning qualities. All tobaccos require ageing, but cigar tobaccos, which have been through the intensified form of fermentation, require less ageing. Pipe, cigar, cigarette, and chewing tobaccos are aged from two to five years before they develop their finest qualities.

WHY SOME TOBACCOS ARE NOT FERMENTED.

In the first place, all types cannot be made to ferment properly, any more than certain good varieties of eating apples can be successfully cooked. Just as some people prefer at times eating apples to cooking apples, dried or tinned apples to cooking apples, so pipe, cigarette, cigar, and chewing tobaccos are in demand, and are grown and cured to meet the various tastes of the consumers.

CHEMICAL CHANGES PRODUCED BY FERMENTATION.

During the fermentation of tobacco there is a loss of as high as 15 per cent. in weight, partly due to loss of moisture, and partly to loss of solid matter, through the decomposition of some of the products which are given off in the form of gases. The presence of ammonia is easily detected by the odour in the fermenting room. The starch changes to sugar, which in turn is usually destroyed in the fermentation.

The enzymes attack the protein contents of the plant cells which continue to be destroyed throughout the fermentation. With the decomposition of the protein contents, "Amino" compounds are formed. There is a loss of nitrate, a decrease in nicotine, and also a large decrease in tannin, the substance which imparts the bitter flavour to tobacco. There is a disappearance of a portion of the fat contents. If much fat or protein is left in the leaf it will create products, when smoked, destructive of the finer aroma; one of the advantages of fermentation is that it does away with these compounds. There is also a decrease of the resin and gums, which seem to bear a close relation to the aroma. It is thought to be quite probable that these split up into other products that are aromatic. Citric, malic, and oxalic acids are present in the cured leaf, and the citric and malic acids may be partly transformed to acetic and butyric acids. These acids certainly have something to do with the aroma; the presence of malic acid is supposed to render the leaves soft, pliable, and elastic. Fermented tobacco is said to have "grain." This grain is a product of the oxidation in the fermentation, and is due to the formation of crystals of calcium oxalate, and manufacturers consider it an evidence of good tobacco. It is certainly an evidence of thorough fermentation. During the fermentation there often appears an efflorescence on the leaf, called "saltpetre" or "light mould"; this is due to the presence of potassium, magnesia, sodium, calcium, and nicotine salts, which may be present in excess, and are forced to the surface during fermentation. They are supposed to injure the quality of tobacco, and are usually removed by spraying with a 4 per cent. solution of acetic acid.

A great many chemists are interested in discovering various changes which take place in tobacco during the curing and fermentation, and from time to time discoveries are made. It is thought that there are possibly a number of the changes which are not yet understood, and the result of future investigations will be awaited with interest.

B. F. SCHERFFIUS,
Government Tobacco Planter.

Jaffna, 29th February, 1916.

Zoology.

THE MONGOOSE AS A SNAKE AND RAT DESTROYER.

Somewhere about the year 1900 it was proposed, owing to the depredations of rats in the canefields, and the numbers of snakes, especially carpet snakes, in the farming districts, to introduce the mongoose from the Barbados. Fortunately, wiser counsels prevailed, and this animal was prohibited. When the sugar-growers of Barbados introduced this rat-destroyer the desired effect was produced, but when there were no more rats to be got, for what of these rodents remained changed their habit of life and made their nests in trees, the mongoose changed its diet and turned its attention to ground-nesting birds, to poultry of all kinds, and eventually became such a scourge that in 1904 an Act was passed by the Legislature of that island offering a reward of 3d. per

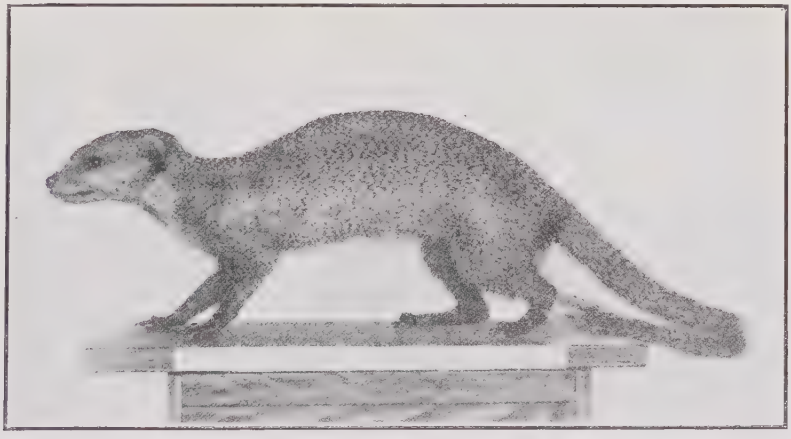


PLATE 19.—THE MONGOOSE.

head for the destruction of the mongoose, and providing a penalty not exceeding £5 to be imposed on any person who should import or attempt to land a mongoose, or even the head of a mongoose. Why the head of the animal should be an object of solicitude we fail to understand. The history of the cattle tick in Jamaica is bound up with that of the mongoose. In 1872 nine mongoose were imported by a Mr. Espent in the hope of exterminating the cane rat, which was making impossible the cultivation of sugar. The mongoose throve and multiplied, and sugar-cane and cocoa-growing were made possible. But when the rats had become few and the mongoose many, between tree-climbing rats and the latter the birds suffered terribly, and the disappearance of insectivorous birds was soon followed by the spread of ticks, which previously the birds had kept under, until the ticks became a perfect scourge.

Yet in 1909 the St. Lucia (W.I.) Agricultural Society imported sixty mongoose from Barbados, and an additional 100 from Barbados or Trinidad. Opinions on the usefulness or destructiveness of the mongoose

appear to differ considerably in the West Indies. The "Journal of the Jamaica Agricultural Society" about that time, writing on the subject, stated that there was no plague of mongoose in Jamaica, and never had been, and that estates then that boasted of trapping hundreds of mongoose a year would within a short time require to fight plagues of rats, use poisons by the hundredweight, traps by the score, and spend several hundreds of pounds a year. This article we published in the issue of this Journal for July, 1909, and added a footnote in which we expressed our agreement with the editor, but have since had reason to alter our opinion.

In March, 1916, under the caption "An Open Season for the Mongoose," in the monthly bulletin of the State Commission of Horticulture, California (vol. V., No. 3), appears an excerpt taken from the Year Book, United States Department of Agriculture, 1898, p. 94, corroborating the statement that "the establishment of the mongoose in California would mean ultimately the annihilation of our ground-nesting birds and serious interference with our poultry industry." Following is the excerpt:—

"Still the mongoose increased (*i.e.*, in the W. Indies and in Hawai), and its omnivorous habits became more and more apparent as the rats diminished. It destroyed young pigs, kids, lambs, kittens, puppies, the native "coney" or capromys, poultry, game, birds which nested on or near the ground, eggs, snakes, ground lizards, frogs, turtles' eggs, and land crabs. It was also known to eat ripe bananas, pineapples, young corn, avocada pears, sweet potatoes, cocoanuts, and other fruits (fallen, presumably, as the mongoose is not a tree climber.—Ed. "Q.A.J.") Towards the close of the second decade the mongoose, originally considered very beneficial, came to be regarded as the greatest pest ever introduced into the island. Poultry and domesticated animals suffered from its depredations, and the short-tailed capromys (*Capromys brachyurus*), which was formerly numerous, became almost extinct except in some of the mountainous districts. The ground dove (*Columbigallina passerina*) and the quail dove (*Geotrygon montana*) became rare, and the introduced bobwhite, or quail, was almost exterminated. The peculiar Jamaica petrel (*Aestrelata caribbæa*), which nested in the mountains of the island, likewise became almost exterminated. Snakes, represented by at least five species, all harmless, and lizards, including about twenty species, were greatly diminished in numbers. The same thing was true of the land and fresh-water tortoises and the marine turtle (*Chelone viridis*), which formerly laid its eggs in abundance in the loose sand on the north coast. The destruction of insectivorous birds, snakes, and lizards was followed by an increase in several injurious insects, particularly ticks, which became a serious pest, and a Coccid moth, the larvæ of which bore into the pimento trees. In 1890 a commission was appointed by the Government to consider whether measures should be taken to reduce the number of the animals, and the evidence collected showed conclusively that the evil results of the introduction of the mongoose far outweighed the benefits rendered to the sugar and coffee plantations."

For the peace of mind of those to whom this article is particularly addressed—the crop producers of the State of California—their Horticultural Quarantine Division assures them that there is not a living mongoose in the State to-day, neither is there going to be as long as the

Quarantine Service is master of the situation at the maritime ports of entry in California; and over and superior to this assurance is the fact that the Federal Government maintains an exclusion against this pest through its Bureau of Animal Industry, and this long capable arm extends to and controls every port of entry in the United States.

The introduction of the mongoose into Queensland, so much advocated some years ago, has been absolutely prohibited, and we are hopeful that the pest will never make its appearance here. Even rabbits would be preferable. We may incidentally remark that mongoose is both singular and plural, the latter being neither gooses nor geese, just as the plural of reindeer is the same as the singular.—[Ed. "Q.A.J."]

THE AMERICAN AND THE AUSTRALIAN OPOSSUM.

We lately received a letter from a correspondent asking for information as to the nomenclature of the so-called Australian opossum. We referred the question to Dr. R. Hamlyn-Harris, Director of the Queensland Museum, who kindly replied as follows:—

The opossums of South America and the so-called opossums of Australia belong to distinct families of the Marsupialia, the former being known as *Didelphyidæ* and the latter as *Phalangerinæ*. Strictly speaking, the word "opossum" should not be used for Australian animals, as the term was first used for the American marsupials, but it would indeed be difficult to change the popular local name. It would be more correct to designate our "opossums" as *Phalangers*. The so-called "flying squirrel" should, of course, be called "flying phalanger," as it has no relationship with the true squirrels. The dual term "Australian opossums," as distinct from "American opossums," would probably solve the difficulty so far as popular literature is concerned.

RICE IN THE NORTH.

Mr. J. F. Keane, of Carbeen, is an enthusiastic rice planter near Mareeba. His crop this season, of which he has sent us a sample stool, averages from 4 to 6 feet in height, each stool averaging about twenty ears. The yield this year he estimates at 40 bushels per acre. He will have a certain quantity of seed for sale at 2d. per lb., which seems a reasonable price for seed acclimated for five years. He states that 24 ounces of paddy will sow one acre. A sowing of 3 ounces resulted in a crop of 5 bushels. No wonder rice is the emblem of prolificacy. We wish him all success and many emulators.

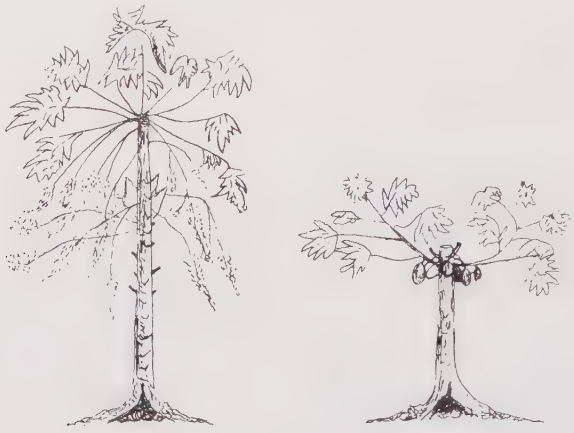
BLACK SPOT IN TOMATOES.

A Sydney suburban gardener, who has been doing a little experimenting, has proved to himself that water with the merest trace of permanganate of potash in it will banish black spot in tomatoes. His directions for use are:—Two teaspoonsful of the permanganate of potash to three gallons (three-quarters of a kerosene tin) of water. He sprays the tree under and over and through, thoroughly drenching every leaf and twig. One application, he says, works a perfect cure.

General Notes.

CHANGING SEX OF THE PAPAW.

The method of changing the sex of the male papaw tree by cutting it down to about three feet of the ground was accidentally proved in a garden at Milton this season. The owner cut down three male trees and inserted a female shoot on top of each. Owing, probably, to the



very dry weather all these shoots died, and two of the trees were rooted out. The third was left, and it sent out two strong shoots about a foot below the top. These shoots bore females flowers, and three fruits matured, one of them remaining on the tree last May, as shown in the accompanying illustration.—[Ed. Q.A.J.]

Answers to Correspondents.

PRICE OF CHICORY ROOTS.

"CHICORY," Cairns—

Any doubt as to the condition of chicory roots when placed on the market by South Australian growers, who receive £3 7s. 6d. per ton, is set at rest by Mr. Finnie, editor of the "S.A. Journal of Agriculture," who has informed us that £3 7s. 6d. per ton is the rate at which producers are paid for the roots just as they clean them and put them on the trucks. Averaging 11 tons of roots per acre, and the price as stated, and the expenses of production as given in our issue of April, 1916, the cultivation of the root should result in very satisfactory returns. Chicory thrives well in the Cairns district.

THE BEST SOIL FOR CITRUS TREES.

"G.N.," Sarina—

The best soil for successful citrus culture is a deep sandy loam with a gravelly or shaly subsoil. The loamy soil should be of a reddish, brownish, or chocolate colour, fairly rich in humus, or organic matter, but not necessarily very rich in plant food. The mechanical condition of the soil is of equal, or even greater, importance than extreme fertility. The subsoil, also, is of greater importance than the soil itself. It should be thoroughly friable, of a red or brownish colour—never yellow, blue, or greyish-white—free from clay, and porous. If the subsoil is of the latter colours, it is a sign that the land is sour, and is impregnated with unoxidised salts of iron, which are detrimental to the growth of citrus trees. Such subsoils require draining and aerating.

THE RABBIT IN AUSTRALIA.

"INQUIRER"—

The rabbit was imported into Queensland some years ago, about the year 1865. In 1868 we obtained a dozen rabbits, and gave them their liberty at Oxley Creek, where they soon made burrows, but for some reason or other, snakes and iguanas probably, they never increased, and finally vanished altogether. The "Brisbane Courier" (May, 1865) stated that "a large and very valuable consignment of rabbits of various new and excellent breeds, from the Royal Society of Brussels, arrived in March last, and are now, after recovery from the voyage, in excellent condition. The Council (of the Acclimatisation Society ?) propose, in the spring of the year, to turn loose one or perhaps two lots of the silver grey breed, of which, by that time, the society will have a larger number than can conveniently or profitably be kept in confinement. The other varieties promise to breed freely, and it is expected that during the next three or four months surplus stock can be sold to cover the cost of their introduction to the colony." It would to-day be more to the point if the State could finance the cost of freeing the country of the rabbits, and so put an end to the immense outlay in the West on rabbit fencing. The rabbit was never indigenous in Australia.

THERMOMETER READING.

CENTIGRADE, FAHRENHEIT, REAUMUR.

"CENTIGRADE," Cairns—

To reduce Centigrade to Fahrenheit: $\frac{\text{Cent. degrees} \times 9}{5} + 32 = \text{Fahrenheit.}$

To reduce Fahrenheit to Centigrade: $\frac{\text{Fahr. degree} - 32 \times 5}{9} = \text{Centigrade.}$

To reduce Réaumur to Fahrenheit: $\frac{\text{Reau. degrees} \times 9}{4} + 32 = \text{Fahrenheit.}$

To reduce Fahrenheit to Réaumur: $\frac{\text{Fahr. degrees} - 32 \times 4}{9} = \text{Réaumur.}$

To reduce Centigrade to Réaumur: $\frac{\text{Cent. degrees} \times 4}{5} = \text{Réaumur.}$

To reduce Réaumur to Centigrade: $\frac{\text{Reau. degrees} \times 5}{4} = \text{Centigrade.}$

Because 9 Fahr. = 5 Centigrade = 4 Réaumur.

TO FIND THE TIME A BODY WILL TAKE IN FALLING FROM A HEIGHT OF 2,000 FEET.

AEROPLANE, ENOGGERA.—Divide the height by 16·1, and extract the square root of the result. If an aviator falls from his machine when at a height of 2,000 ft., then $\frac{2{,}000}{16{\cdot}1} = 124{\cdot}223$ $\sqrt{124{\cdot}223} = 11{\cdot}2$ seconds time taken to reach the ground.

NOMENCLATURE AND NOTES ON GRASSES.

"BRISTOLIAN" Fairfield, Oakey—

Mr. H. C. Quodling, Director of Agriculture, supplies the following answers to your questions:—

1. Sudan Grass, like other sorghums, will give a second crop under favourable circumstances. It is not a suitable grass for grazing off, and is more adapted for hay and ensilage.

2. Feterita belongs to the sorghum family, and should not be fed in an immature state to cattle.

3. No, unless fed in excess quantities. Stock should be accustomed gradually to any change of diet.

4. With some seedsmen, Imphee and Planter's Friend are synonymous. Amber cane seed and Planter's Friend seed are very similar in appearance. When growing, the former has a more branching type of seed panicle, whereas the "head" of the latter is of a more bunchy character. Sorghum Saccharatum has a larger seed than either of the above, and possesses a black, shiny covering almost completely covering

the seed itself. Sorghums are so readily cross-fertilised that there is a noticeable lack of purity to type to be met with in ordinary commercial crops.

5. Sorghum Saccharatum has a branching seed panicle also. Sorghum poisoning is generally so rapid in its action that preventive measures cannot be applied in time to save an animal's life. However, it is considered by some authorities that if any food of this character is given to animals (cattle and pigs), molasses should be fed in conjunction, as the sugar in the molasses checks decomposition. Molasses is regarded as a good antidote for sorghum poisoning in cattle provided the remedy is applied in time. The Government Veterinary Surgeon states that the most satisfactory way of dealing with sorghum poisoning is to use the trochar where there are signs of "hoven," and to give the animal molasses and follow up in an hour's time with stimulants, viz., one wineglass full of turpentine to one bottle of raw linseed oil.

LIMES.

ORCHARDIST, Woombye—

The value of the lime fruit is not appreciated apparently in Australia. In a Bulletin of the Department of Agriculture, Trinidad and Tobago, Vol. XV., we find the following notes on this fruit:—

The yield per acre on an established plantation may be averaged at 24,000 lb. A barrel (160 lb.) of limes gives about 7½ gallons of juice. The following table shows the relative yield in lemon and lime cultivation:—

	Lemons. lb. per acre.	Limes. lb. per acre.
Yield of fruit	27,460	24,000
Yield of juice	10,560	11,550
Containing—		
Citric acid	634	914
Oils	88	65 { 19 / 46

These figures indicate that the yield of fruit per acre in the case of lemons is greater than the yield of limes, taking four lemons to the lb.; but the yield of juice and citric acid is considerably less. The amount of oil yielded, however, is greater in the case of the lemon. The average lemon crop per acre is 110,000 fruits, and if there are 190 trees per acre, this gives a yield per tree of about 580 lemons. The lemon may be regarded as yielding 634 lb. of citric acid per acre against 914 lb. in the case of limes. For essential oils, the figures are 88 lb. and 65 lb. respectively.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY, 1916.

Article.		MAY. Prices.
Bacon	lb.	1s. 4½d.
Barley	bush.	4s. 6d.
Bran	ton	£6 15s.
Broom Millet	„	£37
Butter	cwt.	140s.
Chaff, Mixed	ton	£7
Chaff, Oaten	„	£6
Chaff, Lucerne	„	£6 to £8
Chaff, Wheaten	„	£5
Cheese	lb.	9½d. to 9¾d.
Flour	ton	£12 5s.
Hams	lb.	1s. 4d. to 1s. 5d.
Hay, Oaten	ton	£3 5s.
Hay, Lucerne	„	£5 10s.
Honey	lb.	6½d. to 8d.
Maize	bush.	4s. 8d. to 4s. 10d.
Oats	„	3s. 6d. to 3s. 11d.
Onions	ton	£6
Peanuts	lb.	2¼d. to 4d.
Pollard	ton	£6 15s.
Potatoes	„	£7 10s. to £10 10s.
Potatoes (Sweet)	cwt.	£6 to £7 10s.
Pumpkins	ton	£2 5s.
Eggs	doz.	1s. 10d. to 2s. 11d.
Fowls	pair	4s. 7d. to 7s. 9d.
Ducks, English	„	4s. to 4s. 6d.
Ducks, Muscovy	„	6s. 6d. to 7s. 6d.
Geese	„	6s. 6d. to 8s. 6d.
Turkeys (Hens)	„	9s. to 10s.
Turkeys (Gobblers)	„	13s. to 20s.
Wheat	bush.	5s. 6d. to 6s.

VEGETABLES—TURBOT STREET MARKETS.

Cabbages, per dozen	2s. to 4s.
Beans, per sugar bag	2s. to 3s. 6d.
Beetroot, per dozen bunches	8d. to 1s.
Carrots, per dozen bunches	1s. to 1s. 3d.
Chocos, per quarter-case	1s. 6d. to 2s.
Cucumbers, per dozen	1s. to 1s. 6d.
Custard Marrows, per dozen	1s. to 2s.
Vegetable Marrows, per dozen	1s. to 2s.
Lettuce, per dozen	9d. to 1s.
Peas, per sugar bag	3s. 6d. to 5s. 6d.
Parsnips, per dozen bunches	1s. to 1s. 3d.
Sweet Potatoes, per cwt.	6s. 3d. to 7s. 1d.
Table Pumpkins, per dozen	2s. to 5s. 6d.
Tomatoes, per quarter-case	2s. 6d. to 4s.
Turnips, per dozen bunches	8d. to 1s.

SOUTHERN FRUIT MARKETS.

Article.	APRIL. Prices.
Bananas (Queensland), per bunch	9s. to 11s.
Bananas (Fiji), per bunch	14s. to 18s.
Bananas (G.M.), per bunch	15s. to 20s.
Custard Apples, per tray	6s. to 7s.
Mandarins, per case	...
Mangoes, per case	...
Oranges (Navel), per case	12s. to 18s.
Oranges (other), per case	12s. to 14s.
Passion Fruit, per half-bushel case	7s. to 7s. 6d.
Lemons (Local), per bushel case	13s. to 14s.
Papaw Apples, per double-case	9s. to 11s.
Persimmons, per half-case	...
Pineapples (Queens), per double-case	12s. to 14s.
Pineapples (Ripleys), per double-case	10s. to 12s.
Pineapples (Common), per double-case	6s. to 9s.
Tomatoes, per quarter-case	3s. to 5s.
Cucumbers, per case	...

PRICES OF FRUIT—TURBOT STREET MARKETS.

Article.	MAY. Prices.
Apples, American, per case	6s. to 9s.
Apples, Cooking, per quarter-case	6s. to 8s. 3d.
Apricots, per quarter-case	...
Bananas (Cavendish), per dozen	1½d. to 6d.
Bananas (Sugar), per dozen	2d. to 4d.
Cocoanuts, per sack	12s. to 15s.
Custard Apples, per quarter-case	3s. to 4s.
Granadillas	...
Lemons (Lisbon), per case	4s. to 8s. 6d.
Lemons, per case	10s. to 13s.
Limes, per quarter-case	...
Mandarins (Local), per half-case	6s. to 11s. 6d.
Mangoes, per case	...
Nectarines, per quarter-case	...
Oranges (American, Navel), per case	25s.
Oranges, (Local, Navel), per case	6s. to 8s. 6d.
Oranges (other), per case	5s. to 5s. 9d.
Papaw Apples, per quarter-case	1s. 6d. to 2s. 6d.
Passion Fruit, per quarter-case	6s. to 7s.
Peaches, per case	9s. to 9s. 6d.
Pears, per half-bushel case	7s. to 10s.
Peanuts, per pound	2¼d. to 4d.
Persimmons, per quarter-case	...
Plums, per half-bushel case	4s.
Pineapples (Ripleys), per dozen	3s. to 6s. 6d.
Pineapples (Rough), per dozen	1s. to 3s 6d.
Pineapples (Smooth), per dozen	1s. 6d. to 3s. 6d.
Quinces, per case	3s. 6d. to 6s.
Rockmelons, per dozen	...
Rosellas, per sugar bag	1s. 3d. to 2s. 6d.
Strawberries, per dozen pint boxes	...
Tomatoes, per quarter-case	1s. 9d. to 4s. 6d.
Piemelons	...
Watermelons, per dozen	...

TOP PRICES, ENOGGERA YARDS, APRIL, 1916.

Animal.	APRIL. Prices.
Bullocks	£16 12s. 6d. to £21 12s. 6d.
Bullocks (Single)	...
Cows	£10 2s. 6d. to £13 17s. 6d.
Merino Wethers	39s. 6d.
Crossbred Wethers	41s. 6d.
Merino Ewes	27s. 6d.
Crossbred Ewes	37s.
Lambs	31s.
Pigs (Porkers)	76s.
Pigs (Slips)	...

LONDON QUOTATIONS.

London, May 6.—The market for frozen rabbits is quiet, and prices are unchanged.

The Liverpool quotation for middling American cotton, May-June shipment, is 7·87½d. per lb.

Jute, April-May shipment, from Calcutta, £32 15s.

The hemp market is quiet. New Zealand high point, fair, May-July shipment, £47 10s.

Rubber, fine hard Para, 2s. 10d. per lb.; plantation, first latex crepe, 2s. 9¾d.; smoked sheet, 2s. 8¾d.

Raw linseed oil, spot pipes, £38 per ton.

The only quotation for sisal hemp is for British East African. Recently arrived parcels sold at £55 to £57.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL, 1916 AND 1915, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1916.	April, 1915.		April.	No. of Years' Records.	April, 1916.	April, 1915.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	4·34	15	2·26	0·59	Nambour	4·38	20	9·27	4·17
Cairns	11·99	34	6·38	3·44	Nanango	1·80	34	6·36	0·96
Cardwell	10·05	44	4·65	4·33	Rockhampton ...	2·27	29	2·79	0·02
Cooktown	9·48	40	9·36	7·73	Woodford	3·90	29	14·45	2·15
Herberton	4·12	29	2·76	0·32					
Ingham	8·86	24	4·22	3·81					
Innisfail	22·15	35	19·83	9·15					
Mossman	16·78	5	8·57	2·48	*Darling Downs.*				
Townsville	3·81	45	0·05	0·62					
					Dalby	1·29	46	1·81	0·44
					Emu Vale	1·21	17	2·34	0·79
Central Coast.					Jimbour	1·48	24	3·31	1·16
					Miles	1·46	31	2·19	0·96
Ayr	2·85	29	0·26	0·48	Stanthorpe ...	1·75	43	3·97	2·09
Bowen	3·12	45	0·96	0·69	Toowoomba ...	2·44	44	7·92	1·00
Charters Towers ...	1·77	34	1·71	0·67	Warwick	1·35	29	2·77	0·72
Mackay	6·90	45	5·98	2·10					
Proserpine	6·56	13	4·11	4·12					
St. Lawrence ...	2·83	45	3·05	0·06	*Maranoa.*				
					Roma	1·31	42	1·78	0·98
South Coast.									
Biggenden	1·73	14	1·75	0·65	*State Farms, &c.*				
Bundaberg	2·78	33	3·96	0·44					
Brisbane	3·70	65	8·95	2·41	Bungeworgorai ...	0·96	3	0·65	0·50
Childers	2·33	21	3·56	0·11	Gatton College ...	1·84	14	4·83	1·38
Crohamhurst ...	5·22	22	16·63	1·30	Gindie	1·42	13	1·19	0·08
Esk	2·60	29	6·91	1·91	Hermitage ...	1·32	7	3·25	0·80
Gayndah	1·29	45	2·79	1·36	Kairi	3·26	3	5·32	0·82
Gympie	3·13	46	2·80	0·58	Kamerunga Nurs'y	12·06	27	7·48	3·52
Glasshouse M'tains	4·52	6	13·77	3·19	Sugar Experiment				
Kilkivan	2·08	37	3·41	0·86	Station, Mackay	5·07	16	8·03	2·57
Maryborough ...	3·27	45	4·97	1·01	Warren	...	...	1·03	Nil

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April this year and for the same period of 1915, having been compiled from telegraphic reports are subject to revision.

GEORGE G. BOND,
Divisional Officer.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET AT BRISBANE AND THE PHASES OF THE MOON FOR THE SECOND FOUR MONTHS OF 1916.

Date	MAY.		JUNE.		JULY.		AUGUST.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·14	5·16	6·31	5·0	6·40	5·3	6·30	5·18
2	6·14	5·15	6·31	5·0	6·40	5·4	6·30	5·18
3	6·15	5·14	6·32	5·0	6·40	5·4	6·29	5·19
4	6·15	5·13	6·32	5·0	6·40	5·4	6·29	5·20
5	6·16	5·13	6·33	5·0	6·40	5·4	6·28	5·20
6	6·17	5·12	6·33	5·0	6·40	5·5	6·28	5·20
7	6·17	5·12	6·34	5·0	6·40	5·5	6·27	5·21
8	6·18	5·11	6·34	4·59	6·40	5·6	6·26	5·21
9	6·18	5·10	6·35	4·59	6·39	5·6	6·25	5·22
10	6·19	5·10	6·35	4·59	6·39	5·7	6·24	5·23
11	6·19	5·9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·9	6·35	4·59	6·39	5·7	6·22	5·24
13	6·20	5·8	6·36	4·59	6·39	5·8	6·21	5·25
14	6·21	5·8	6·36	4·59	6·39	5·8	6·20	5·25
15	6·21	5·7	6·36	4·59	6·39	5·9	6·19	5·26
16	6·22	5·7	6·37	4·59	6·38	5·9	6·18	5·26
17	6·22	5·6	6·37	4·59	6·38	5·10	6·17	5·26
18	6·23	5·6	6·38	5·0	6·37	5·10	6·17	5·27
19	6·24	5·5	6·38	5·0	6·37	5·11	6·16	5·27
20	6·24	5·5	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·38	5·0	6·36	5·12	6·14	5·28
22	6·26	5·4	6·39	5·1	6·36	5·12	6·13	5·28
23	6·26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	6·27	5·3	6·39	5·1	6·35	5·13	6·11	5·29
25	6·27	5·2	6·39	5·1	6·34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·1	6·33	5·15	6·9	5·30
27	6·28	5·1	6·40	5·2	6·33	5·15	6·8	5·30
28	6·29	5·1	6·40	5·2	6·32	5·16	6·7	5·31
29	6·29	5·1	6·40	5·2	6·32	5·16	6·6	5·31
30	6·30	5·0	6·40	5·3	6·31	5·17	6·5	5.32
31	6·30	5·0	...	...	6·31	5·17	6·4	5·32

The Phases of the Moon commence at the times stated on or near the 150th Meridian, East Longitude.

			H.	M.	
2 May	●	New Moon	3	29	p.m.
10 „	☾	First Quarter	6	47	„
18 „	○	Full Moon	12	11	a.m.
24 „	☽	Last Quarter	3	16	p.m.

The moon will be farthest from the earth on the 7th, and nearest on the 19th.

1 June	●	New Moon	5	37	a.m.
9 „	☾	First Quarter	9	59	..
16 „	○	Full Moon	7	42	..
22 „	☽	Last Quarter	11	16	p.m.
30 „		New Moon	8	43	„

The moon will be farthest from the earth on the 4th, and nearest on the 16th at midnight.

8 July	☾	First Quarter	9	55	a.m.
15 „	○	Full Moon	2	40	„
22 „	☽	Last Quarter	9	33	„
30 „	●	New Moon	12	15	p.m.

The moon will be nearest to the earth on the 15th, and farthest from it on the 28th.

7 Aug.	☾	First Quarter	5	6	a.m.
13 „	○	Full Moon	10	0	p.m.
21 „	☽	Last Quarter	10	52	..
29 „	●	New Moon	3	25	a.m.

The moon will be nearest to the earth on the 12th, and farthest from it on the 25th.

A partial eclipse of the moon will occur on 15th July at 2 30 p.m., when the moon will be below the horizon in Australia.

An eclipse of the sun will take place on 30th July. It will be partial only in Queensland but annular, or leaving the edge of the sun visible as a magnificent golden ring at Adelaide, and in a line across the south-west of Australia.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise and set about 4 minutes later than at Brisbane if its elevation (1,900 feet) did not counteract the difference in longitude. In this case the times of sunrise and sunset are nearly the same as those for Brisbane.

At St. George, Cunnamulla, Thargomindah, and Oontoo the times of sunrise and sunset will be about 18 m., 30 m., 38 m., and 49 minutes, respectively, later than at Brisbane at this time of the year.

At Roma the times of sunrise and sunset during May, June, July, and to the middle of August may be roughly arrived at by adding 20 minutes to those given above for Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is then practically checked, and the young lucerne plants will, therefore, not be checked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time weeds once more appear it will be well able to hold its own against them. From 10 to 12 lb. of seed drilled, or 15 to 16 lb. broadcast, will be sufficient for an acre. This is also the time to prepare the land for many field crops, such as potatoes, maize, oats, and barley for green fodder; also, rye, vetches, tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes during this month in any districts liable to late frosts or in low-lying ground. Under such conditions, it is far better to wait until well into the following month. The greatest loss in potatoes and sugar-cane has been, on more than one occasion, experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities it is better to wait until the middle or end of August. Get the ground ready for sowing French beans and other spring crops. Sow Guada beans (snake gourd) at the end of September.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolor, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for July.

THE SOUTHERN COAST DISTRICTS.

The notes for the month of June apply to July as well. The first crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf-blight, and spray for same with Bordeaux mixture, also watch for the first signs of the grey mould that attacks the fruit, and spray with the sulphide of soda wash. The larvæ of the cockchafer, that eats the roots of strawberries, should be looked for, and destroyed whenever found. Pruning of citrus and other fruit trees may be continued; also, the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunks or the branches at or near where they form the head of the tree, is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay the eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following month, particularly of smooth leaves. See that any conspicuous fruits are protected by a wisp of grass, as they are injured not only by frost but by cold westerly winds.

THE TROPICAL COAST DISTRICTS.

See the instructions given for the month of June. Keep the orchards clean and well worked. Prune and spray where necessary.

THE SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop—both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month; if possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, when the earlier planted trees, which have had a longer time to become established, will do all right—provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Do not neglect to cut back hard when planting, as the failure to do so will result in a weakly growth.

As soon as the pruning is completed, the orchards should get their winter spraying with the sulphur limewash, and either with or without salt, as may be wished. See that this spraying is thoroughly carried out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of canker, bark-rot, moss, lichens, &c.

Where the orchard has not been ploughed, get this done as soon as the pruning and spraying are through, so as to have the land in good order for the spring cultivations. See that the work is well done, and remember that the best way to provide against dry spells is to keep moisture in the soil once you have got it there, and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties that are of proved merit in your district; do not plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but where the vines have become covered with long straggling spurs, and are generally very unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.